

# 國立交通大學

多媒體工程研究所

碩士論文

冷卻骨牌遊戲之組合對局值

Combinatorial Game Values of Chilled Domineering

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中華民國 一 百 年 九 月



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## 摘要

組合對局理論是一種利用數學方法分析對局遊戲的理論。此理論以對局樹表示遊戲盤面狀態，使遊戲盤面的結果可以對局數值表示，並且由對局值推導盤面優勢及勝敗結果。

傳統骨牌遊戲是一個適用於組合對局理論範疇的對局遊戲，經由研究骨牌遊戲，可以得知此遊戲的許多盤面勝負結果以及對局值。

2010 年由高國元等人提出了冷卻骨牌遊戲，它改變了傳統骨牌遊戲的規則，複雜度較高。高國元等人分析了所有  $3 \times 3$  大小的冷卻骨牌遊戲盤面，提出一線性公式簡化並計算  $3 \times 3$  盤面對局值。

這篇研究的目的是實作分析冷卻骨牌遊戲盤面的程式，驗證  $3 \times 3$  大小的冷卻骨牌遊戲對局值。進一步計算  $4 \times 4$  大小盤面的對局值，分析結果，並加以分類，嘗試找出簡化並計算  $4 \times 4$  盤面結果的方法。

# Combinatorial Game Values of Chilled Domineering

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## Abstract

Combinatorial Game theory uses mathematical theory to study computer games. The theory describes a game position with a game tree and makes a specific value stand for the result of a game. This game value helps us to analyze the advantage of both players and find the optimum moves.

Combinatorial game theory can be applied to Domineering. By studying the game with combinatorial game theory, we know many results of different Domineering game positions.

Chilled Domineering is a game invented by Kao et al. in 2010. The rule of chilled domineering is different from domineering and its complexity is higher than domineering. They analyzed all the 3x3 positions of chilled domineering and provided a linear formula to simplify and calculate the position value.

The main purpose of this research is to implement a program to analyze Chilled Domineering, generate all 4x4 positions, and calculate the values. Moreover, the research analyzes and categorizes these values and tries to find a way to determine the winner of the position.

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# 目錄

|                                       |      |
|---------------------------------------|------|
| 摘要 .....                              | iv   |
| Abstract.....                         | v    |
| 誌謝 .....                              | vi   |
| 圖表目錄 .....                            | viii |
| 表格目錄 .....                            | ix   |
| 第一章、介紹 .....                          | 1    |
| 1.1. 組合對局理論介紹.....                    | 1    |
| 1.2. 骨牌遊戲及冷卻骨牌遊戲介紹.....               | 2    |
| 1.3. 研究目的.....                        | 4    |
| 1.4 貢獻.....                           | 5    |
| 1.5 論文組織.....                         | 5    |
| 第二章、研究背景 .....                        | 6    |
| 2.1. 組合對局理論.....                      | 6    |
| 2.2. Combinatorial Game Suite 程式..... | 14   |
| 2.3 冷卻骨牌遊戲之 3x3 盤面.....               | 16   |
| 第三章、研究方法 .....                        | 19   |
| 3.1 冷卻骨牌遊戲程式.....                     | 19   |
| 3.2 冷卻骨牌程式產生的子盤面.....                 | 20   |
| 3.3 刪去未連接之子盤面.....                    | 20   |
| 3.4 刪去重覆之子盤面.....                     | 21   |
| 第四章、實驗 .....                          | 27   |
| 4.1 實驗環境.....                         | 27   |
| 4.2 驗證 3x3 子盤面.....                   | 27   |
| 4.3 4x4 子盤面之值.....                    | 28   |
| 第五章、結論與未來展望 .....                     | 38   |
| 參考文獻 .....                            | 40   |
| 附錄 I.....                             | 41   |

# 圖表目錄

|   |    |
|---|----|
| 圖 1 骨牌遊戲.....                                     | 2  |
| 圖 2 已結束的骨牌遊戲，勝利者為垂直方向著手的一方.....                   | 3  |
| 圖 3 進行到一半的冷卻骨牌遊戲.....                             | 3  |
| 圖 4 已結束的冷卻骨牌遊戲，勝利者為水平方向著手的一方.....                 | 4  |
| 圖 5 進行到一半的骨牌遊戲盤面.....                             | 9  |
| 圖 6 骨牌遊戲(圖 5)的子盤面.....                            | 10 |
| 圖 7 骨牌遊戲(圖 5)的子盤面對局值.....                         | 10 |
| 圖 8 * (star)的二元樹表示法.....                          | 11 |
| 圖 9 up, down 的二元樹表示法.....                         | 13 |
| 圖 10 Combinatorial Game Suite 的操作介面.....          | 15 |
| 圖 11 利用 Combinatorial Game Suite 建立的冷卻骨牌遊戲程式..... | 19 |
| 圖 12 沒有連接在一起的盤面.....                              | 21 |
| 圖 13 沒有連接在一起的盤面可視為兩個獨立子盤面相加.....                  | 21 |
| 圖 14 平移到左上角.....                                  | 22 |
| 圖 15 平移到左上角(2).....                               | 22 |
| 圖 16 水平翻轉.....                                    | 23 |
| 圖 17 垂直翻轉.....                                    | 23 |
| 圖 18 順時鐘旋轉九十度.....                                | 24 |
| 圖 19 順時鐘旋轉 180 度.....                             | 24 |
| 圖 20 逆時鐘旋轉九十度.....                                | 25 |
| 圖 21 轉置盤面.....                                    | 25 |
| 圖 22 以對角線為中軸翻轉.....                               | 26 |
| 圖 23 空格 11 的某一個盤面.....                            | 30 |
| 圖 24 圖 23 之盤面的對局樹.....                            | 30 |



# 表格目錄

|  |    |
|--|----|
| 表 1 整數的二元樹表示法.....   | 7  |
| 表 2 分數的二元樹表示法.....   | 8  |
| 表 3 3x3 子盤面的數量.....  | 28 |
| 表 4 4x4 子盤面的數量.....  | 29 |
| 表 5 4x4 子盤面，50 種不同的原子重.....                                    | 31 |
| 表 6 4x4 子盤面，七格空格以下之盤面狀況及對局值(Value)、原子重<br>(Atomic Weight)..... | 32 |



# 第一章、介紹

本篇研究建立在組合對局理論的基礎上，因此一開始的章節中，會先介紹組合對局理論。

骨牌遊戲是一個符合組合對局遊戲特性的對局遊戲，而冷卻骨牌遊戲是將骨牌遊戲的規則加以變化。在本章節中會介紹兩個遊戲的規則特性，並提出相關研究的動機，在章節 1.1 之中會介紹組合對局理論，章節 1.2 介紹骨牌遊戲和冷卻骨牌遊戲，章節 1.3 提出研究動機與目的。

## 1.1. 組合對局理論介紹

組合對局理論的根源可追溯到 1902 年[1]，但其理論是直到 1976-1982 年間藉由 Conway 的著作[2]以及 Berlekamp 等人的著作[3]，方有完整論述[4]。

組合對局遊戲(Combinatorial Game)具有以下特性：

1. 雙人遊戲，兩方輪流著手(通常稱左方 Left 以及右方 Right)。
2. 遊戲是完美訊息(perfect information)賽局，並不存在機率機制。
3. 遊戲必定會有終止。
4. 遊戲結果無和局，必定有一方為勝者。

一般情況下，勝利方為最後可著手的一方，此種獲勝條件稱作 Normal Play；反之，若定義最後可著手的一方為落敗者，稱 Misère play。本篇研究探討的對局遊戲均屬 Normal Play 規則之範疇。

符合組合對局遊戲特性的對局遊戲有：Nim, Triangular Nim, Domineering 等。

在遊戲進行的過程中，遊戲盤面會被分開成許多獨立區域，這些獨立區域的

對局值可以被加總起來，代表整個盤面的結果。

組合對局理論的目的是利用數學方法，計算遊戲的對局值，找出目前盤面對某方玩家的優勢程度。並進一步決定對局遊戲的結果、找到必勝的策略。

## 1.2. 骨牌遊戲及冷卻骨牌遊戲介紹

本章節介紹符合組合對局遊戲特性之骨牌遊戲以及冷卻骨牌遊戲之規則。

### 1.2.1 骨牌遊戲

骨牌遊戲的英文名稱為 Domineering。骨牌遊戲是在一個  $m \times n$  大小的棋盤上進行。兩位遊戲者分別放置大小為  $2 \times 1$  的骨牌於棋盤上，一方只能垂直地放置骨牌；而另外一方只能水平地放置(如圖 1)。當有一方無法再放置骨牌於棋盤上時，遊戲就結束，而放置最後一片骨牌者為勝利方(如圖 2)。



圖 1 骨牌遊戲

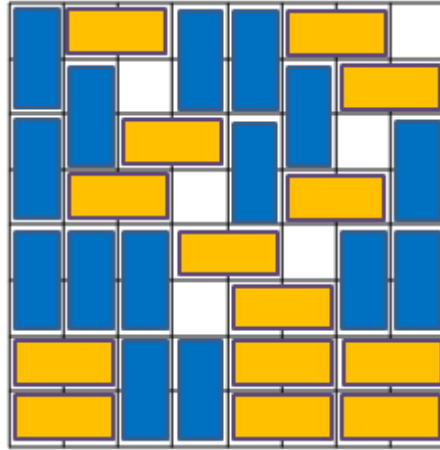


圖 2 已結束的骨牌遊戲，勝利者為垂直方向著手的一方

## 1.2.2 冷卻骨牌遊戲

冷卻骨牌遊戲的英文名稱是 Chilled Domineering[5]。它是由高國元等人在 2010 年提出的。其規則與骨牌遊戲相同；但在一個獨立的盤面區域中，若有一方無法再放置 2x1 大小的骨牌時，可以改放置 1x1 大小的骨牌於棋盤上(如圖 3)，而放置最後一片骨牌者為勝利方(如圖 4)。其複雜度會高於骨牌遊戲。

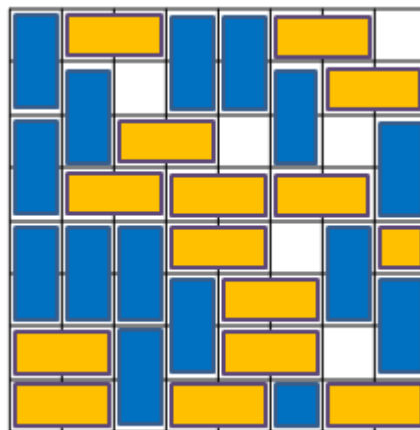


圖 3 進行到一半的冷卻骨牌遊戲

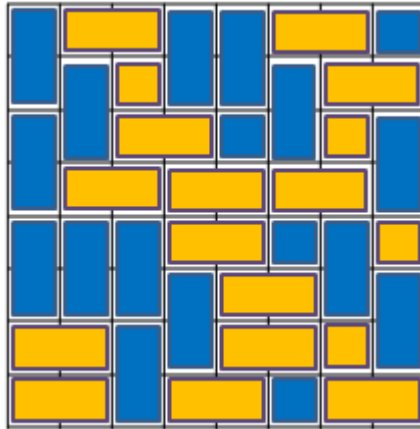


圖 4 已結束的冷卻骨牌遊戲，勝利者為水平方向著手的一方

### 1.3. 研究目的

運用組合對局理論研究對局遊戲，是一種利用數學技巧簡化對局問題的方法。一般研究對局的人工智慧多是以 Search 方法為基礎發展不同的技術，例如: Game Tree Search、Heuristic Function 與 Transposition Tables 等。組合對局理論不需要藉由 Search 方法，在面對複雜度高的對局遊戲時，能分析並降低對局問題的複雜度，將可降低解題的難度並縮短解題時間。

而冷卻骨牌遊戲是一種符合組合對局理論範疇的遊戲；藉著研究組合對局理論應用於冷卻骨牌遊戲的成果，以發展不同的簡化對局問題方法，能進一步探討組合對局理論的遊戲值以及結果。

這篇論文的目的是想藉由程式來自動產生冷卻骨牌遊戲的子盤面，且計算盤面的對局值。加以分析後，能幫助冷卻骨牌遊戲的盤面勝負判斷。更進一步分析具有不同意義的組合對局值。

## 1.4 貢獻

這篇論文的貢獻，主要為以下幾項：

1. 冷卻骨牌遊戲程式

在現有的組合對局程式工具上建立冷卻骨牌遊戲之規則，可產生冷卻骨牌遊戲盤面並計算盤面對局值的程式。

2. 冷卻骨牌遊戲盤面產生、計算及驗證

產生 3x3, 4x4 大小之所有子盤面，並檢驗[5]所提出的 3x3 冷卻骨牌遊戲值。

3. 重複冷卻骨牌遊戲盤面刪除

排除旋轉對稱後相同之盤面以及非獨立之所有盤面，降低所需要分析的盤面數量。

4. 分析冷卻骨牌遊戲的盤面結果

將所產生及計算出的對局值予以分類以及簡化成新定義之符號，對應到[5]所提出的分類。

## 1.5 論文組織

本篇論文第二章是研究背景，在研究背景中，會介紹本篇論文使用的相關程式，及相關研究，包括組合對局理論、冷卻骨牌遊戲，第三章是研究方法，該章節中提出本研究的實作方法，第四章是實驗，在該章節中會有 3x3, 4x4 盤面的數量及分析結果，第五章是結論以及未來展望。

## 第二章、研究背景

在這個章節中，會介紹組合對局理論、冷卻骨牌遊戲及現有的組合對局理論程式工具：在 2.1 章節中會介紹組合對局理論，2.2 章節中會介紹所用的程式工具 Combinatorial Game Suite 以及以它為基礎而建立的冷卻骨牌程式。在 2.3 章節則會介紹冷卻骨牌遊戲的研究及其對局值的分析結果。

### 2.1. 組合對局理論

組合對局遊戲的特性是遊戲必定會終止，且終止時必定有勝負方的存在。因此組合對局遊戲的結果必定為以下四種中的一種[2][3]：

1. 左方必勝
2. 右方必勝
3. 先手必勝
4. 先手必敗



#### 2.1.1 組合對局遊戲的定義

我們可以以一棵樹來表示一個遊戲：根節點(root)代表遊戲的初始位置(initial position)，每個節點(node)代表位置(position)，分支(branch)代表合法的移動；左方的移動將被表示在左子樹，右方的移動將被表示在右子樹。

假設以  $G$  代表一個遊戲， $G^L$  代表左方的移動， $G^R$  代表右子樹的移動，則  $G$  可以被表示成[6]：

$$G = \{G^L | G^R\}$$

而將左右雙方的移動顛倒過來，則會產生  $G$  的負值，定義為：

$$-G = \{-G^R | -G^L\}$$

若有另外一個遊戲  $H$ ，則  $G$  和  $H$  相加定義為：

$$G+H=\{ G^L + H, G + H^L \mid G^R + H, G + H^R \}$$

在遊戲  $G$  進行的過程中，若盤面被分隔成為兩個獨立區域  $A$  和  $B$ ，則此盤面的對局值即為  $A$ 、 $B$  兩區域的對局值相加。

## 2.1.2 數字的定義

遊戲的結果可用數值來代表，不同的數值會對應到不同的勝敗結果。

一個數值  $G$  可以用  $\{G^L \mid G^R\}$  表示：若為一個遊戲  $G$  之對局值為數字(number)，則每個在  $G^L$ 、 $G^R$  的元素均為數字且  $G^L$  中的元素皆小於  $G^R$  中的任一元素。

一個遊戲若是雙方均無合法步可下，則定義為零：

$$0=\{\}$$

整數的定義：

$$1=\{0\}$$

$$2=\{1\}$$

$$3=\{2\}$$

...

$$n=\{n-1\}$$

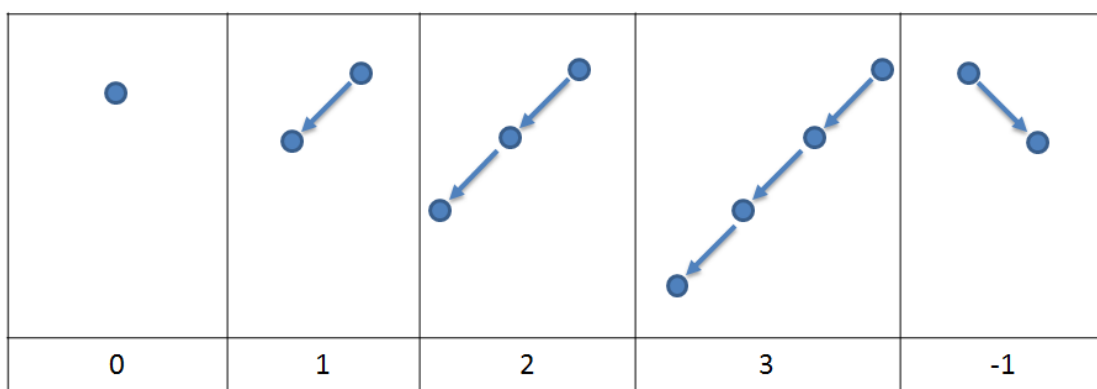


表 1 整數的二元樹表示法



分數的定義：

$$1/2 = \{0|1\}$$

$$1/4 = \{0|1/2\}$$

$$3/4 = \{1/2|1\}$$

...

$$m/2^k = \{(m-1)/2^k \mid (m+1)/2^k\}$$

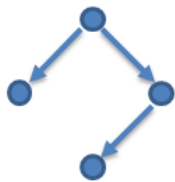
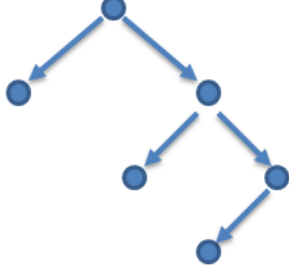
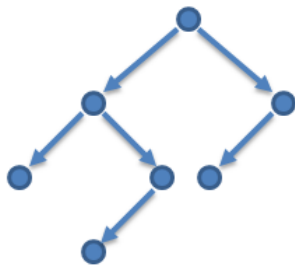
|   |   |   |
|---|---|---|
|  |  |  |
| 1/2   | 1/4   | 3/4   |

表 2 分數的二元樹表示法

遊戲的結果和數值對應的結果[2][3][6][7]：

$G > 0$ ：左方必勝

$G < 0$ ：右方必勝

$G = 0$ ：先手必敗

$G \parallel 0$ ：先手必勝

若遊戲的數值  $G$  無法和 0 比較大小( $G$  不大於 0，不小於 0，亦不等於 0)，則稱  $G$  is fuzzy with 0，以  $G \parallel 0$  表示。

## 2.1.3 骨牌遊戲之值

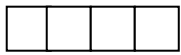
在骨牌遊戲的進行過程中，整個盤面可能會被分割成數個獨立的小型空盤面，以下分析一些簡單的盤面值：



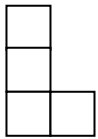
此盤面對於遊戲雙方都無合法著手，故  $G=\{\emptyset\}=0$



左方有一合法步，故  $G=\{0|\}=1$

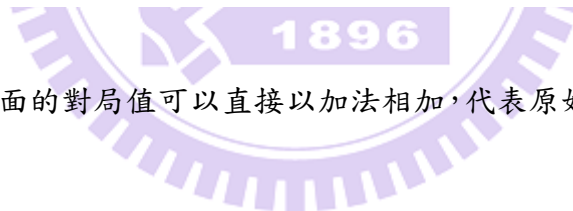


右方有兩合法步，可移動到結果為  $0(\square)$  或  $-1(\square\square)$  的子盤面，故  $G=\{0, -1\} = -2$



左方有兩合法步，可移動到結果為  $0(\square+\square)$  或  $-1(\square\square)$  的子盤面，右

方則有唯一合法步移動到  $1(\square)$ ；故  $G=\{0, -1|1\}=\{0|1\}=1/2$



這些獨立小盤面的對局值可以直接以加法相加，代表原始大盤面的對局值。

以圖 5 為例

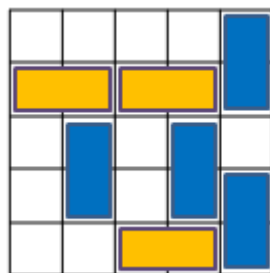


圖 5 進行到一半的骨牌遊戲盤面

此時的盤面包含以下四個獨立的子盤面

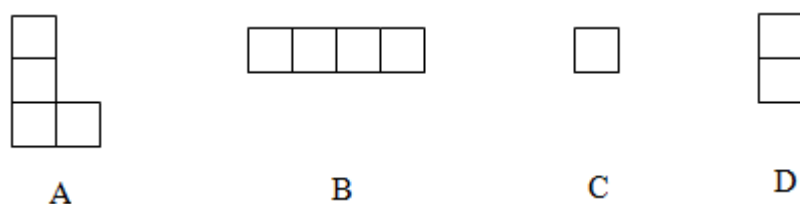


圖 6 骨牌遊戲(圖 5)的子盤面

則圖 5 的遊戲  $G$  對局值即為圖 6 中  $A, B, C, D$  四個子盤面的對局值相加。 $G = A + B + C + D$ .

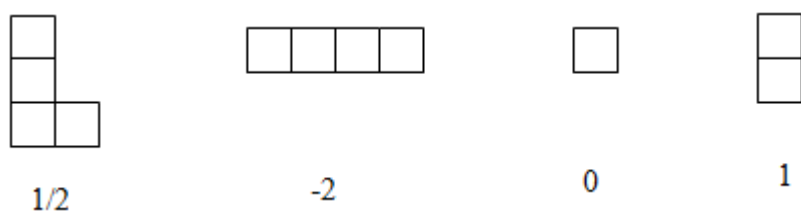
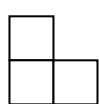


圖 7 骨牌遊戲(圖 5)的子盤面對局值

圖 7 是此四個子盤面之對局值，故  $G = 1/2 + (-2) + 0 + 1 = -1/2 < 0$ ，此遊戲  $G$  為右方必勝。

有些骨牌遊戲盤面的對局值並非一般所認知的實數，例如：



左右兩方均有一合法步可移動到結果為  $0$  (□) 的子盤面，故此盤面的值為  $G = \{0|0\}$ 。這個值我們定義為\* (star)。

類似像\*這種不屬於傳統數字範疇的數值，將在下一節詳細介紹。

## 2.1.4 微數字的定義

微數字的英文名稱為 infinitesimal。一個遊戲的對局值若小於所有的正數 (positive number) 且大於所有的負數 (negative number)，則為微數字[5]。

微數字有兩個重要的子群：

(1) Nimber[8][9][10]

一對局  $G$  稱之為「對稱數」若且唯若  $G^L$  和  $G^R$  中的每個元素都是對稱數，且  $G^L = G^R$ 。

$0 = \{\emptyset | \emptyset\}$  是最簡單的對稱數。以下為更多的對稱數定義：

$$*1 = \{0 | 0\},$$

$$*2 = \{0, *1 | 0, *1\},$$

$$*n = \{0, *1, *2, \dots, *(n-1) | 0, *1, *2, \dots, *(n-1)\}。$$

一對局遊戲  $G$  稱 impartial game 若其左右雙方的合法步都是相同的 ( $G^L = G^R$ )，且每個  $G^L, G^R$  中的元素亦為 impartial game；impartial game 的對局值必等於一個 Nimber。



圖 8 \* (star) 的二元樹表示法

star 具有以下特性：

- $* \parallel 0$
  - $* + * = \{ * | * \} = 0$
  - $* = - *$
  - 若  $G$  的  $G^L = G^R$  且  $G^L, G^R$  中的元素均為 number  $*a, *b, *c, \dots$ ，則  $G$  的值為一 number,  $*m$ ,  $m$  為不在  $*a, *b, *c$  中的最小數字。
- 例如  $G = \{ *0, *2, *3 | *0, *2, *3 \} = *1$ .

## (2) Sumer[11]

對於每個數字  $d$ ，定義

$$\uparrow(d) = \{ \uparrow(d^L), * | \uparrow(d^R), * \}$$

例如  $\uparrow(1) = \{ 0 | * \}$ ，通常簡記為  $\uparrow$ ，稱為 up。  $\uparrow$  的負值為  $\{ * | 0 \} = \downarrow$ ，稱為 down。

$$\downarrow(d) = -\uparrow(d)$$

$n$  個  $\uparrow$  的和可用  $n \cdot \uparrow(d)$  表示：

$$0 \cdot \uparrow(d) = 0$$

$$n \cdot \uparrow(d) = (n-1) \cdot \uparrow(d) + \uparrow(d), n > 0$$

一個 *sumber*  $S$  為 ups, downs, stars 的總合：

$$S = \sum_{k=1, n} a_k \cdot \uparrow(d_k) + a_0 \cdot *, .$$

up 具有以下特性：

- 對於所有的  $d_2 > d_1$ ， $0 < \uparrow(d_1) < \uparrow(d_2)$
- 對於所有  $d_2 > d_1 > 0$ ， $\uparrow(d_2) + \uparrow(d_2) - \uparrow(d_1) + * > 0$
- 對於所有的  $d_3 > d_2 > d_1 > 0$  以及  $n \geq 0$ ，  

$$\uparrow(d_2) - \uparrow(d_1) > n \cdot (\uparrow(d_3) - \uparrow(d_2))$$

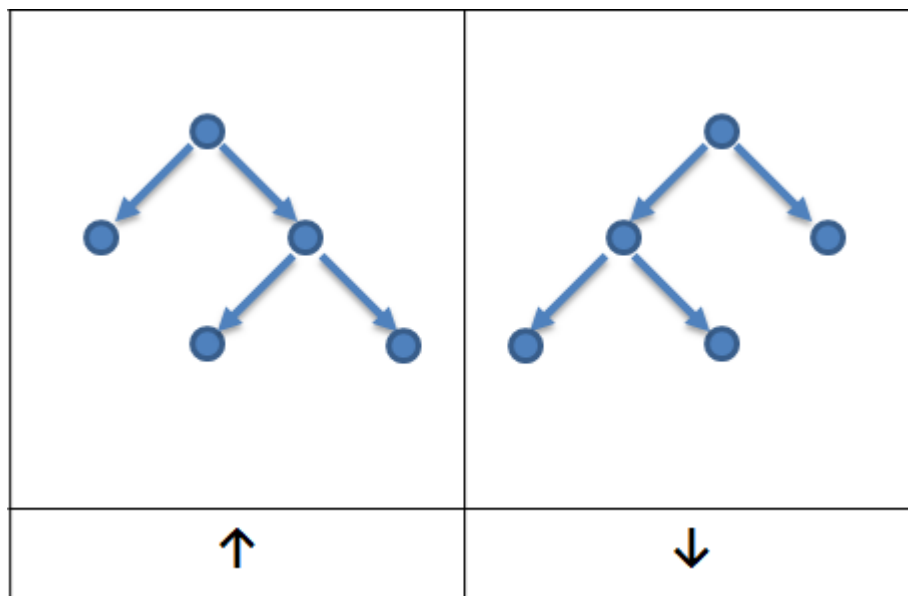


圖 9 up, down 的二元樹表示法

## 2.1.5 冷卻骨牌遊戲之值

冷卻骨牌遊戲在遊戲盤面尚有空格時，雙方均可再著手，因此其對局值並不會是傳統數字，而是微數字。

以下分析一些簡單的冷卻骨牌遊戲對局值：

此盤面對於遊戲者雙方均有一合法步，故  $G=\{0|0\}=*$

左方有一合法步移動到 0，右方亦有一合法步移動到\* ()，故  $G=\{0|*\}=\uparrow$

左方有一合法步移動到\* ()，右方亦有一合法步移動到\* ()，故  $G=\{**\}=0$

## 2.1.6 原子重

若一遊戲其左右方玩家從每一個非終點之位置均有合法的移動，例如  $*$  = {0|0}、 $\uparrow$  = {0|\*}，也就是每個非終點之位置的對局值均為微數字，則稱為 all small game[3]。

對於一個 all small game  $G = \{a, b, c, \dots | d, e, f, \dots\}$ ，定義一值 AW 稱做 G 之原子重(Atomic Weight)：已知 A, B, C, D, E, F, ... 為 a, b, c, d, e, f, ... 之原子重，

$$AW = \{A-2, B-2, C-2, \dots | D+2, E+2, F+2, \dots\}$$

原子重代表最接近 G 之 up 數量，有助於我們判斷哪方遊戲者佔有盤面優勢：

以下是一些盤面值與原子重的關係

- 若 G 之原子重大於或等於二，則 G 之對局值大於或等於零。
- 若遊戲盤面值為對稱數(Nimber)，其原子重為零。
- $\uparrow$ (up)的原子重為 1。
- $\downarrow$ (down)的原子重為 -1。
- 若盤面 P, Q, R 的原子重為 p, q, r，則盤面 P+Q+R 之原子重為 p+q+r。

原子重具有線性的特性，是除了對局值外另外一個可以幫助我們分析盤面狀況的資料。

## 2.2. Combinatorial Game Suite 程式

Combinatorial Game Suite[12]是一個由 Aaron Siegel 所開發的程式，從 2003 年發布 0.1 版開始，2007 年的 0.7beta 版是最新版。它是一個使用 JAVA 程式語言撰寫的 open source 程式，其完整程式碼可以在網站上下載。

Combinatorial Game Suite 這個程式提供了一個 GUI 介面(圖 10)，操作方式類似 Mathematica 以及 Maple。它具有以下功能：

1. 所有標準的組合對局理論操作，例如：計算盤面的對局值、大小、計算對局值的數學運算
2. 提供一個圖形化的對局盤面編輯介面，並可用 Game Tree 方式表示對局
3. 一個彈性化的架構，可以讓使用者自行加入不同規則的對局遊戲模型
4. 提供 Script language 可以讓使用者進行遞迴運算、迴圈、條件式、函數等操作
5. 為 Misère play 以及 impartial game 提供專門的模組

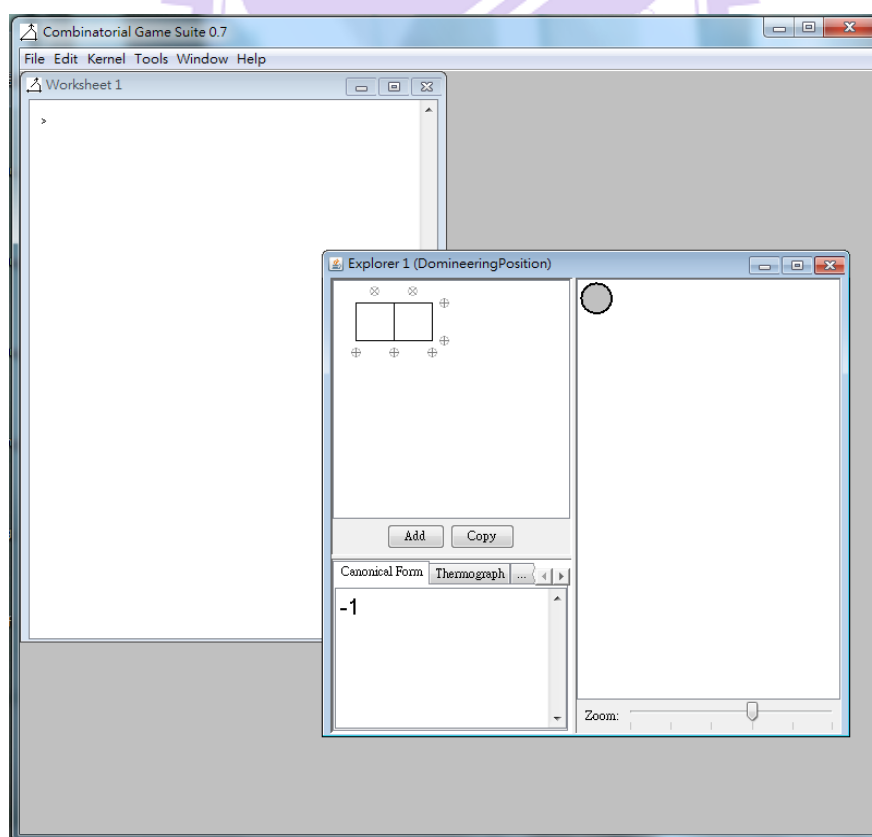


圖 10 Combinatorial Game Suite 的操作介面



## 2.3 冷卻骨牌遊戲之 3x3 盤面

本節介紹冷卻骨牌遊戲的研究[5]，描述在 3x3 大小的盤面下，冷卻骨牌遊戲的所有子盤面以及其分類、結果。

### 2.3.1 3x3 大小子盤面的基本盤面

在[4]中列出了所有不重複的 3x3 大小的冷卻骨盤遊戲變化，每個 3x3 的冷卻骨牌遊戲子盤面都是由以下八個基本盤面之和所組成的：

$$* = \{0|0\},$$

$$\uparrow = \{0|*\},$$

$$\uparrow+ = \{\uparrow|*\},$$

$$\uparrow/2 = \{\uparrow\uparrow*|\downarrow*\},$$

$$\star = \{0, \uparrow*|\downarrow*, 0\},$$

$$*/2 = \{\uparrow\uparrow|\downarrow\downarrow*\},$$

$$(* / 2) + = \{\uparrow\uparrow, \uparrow\uparrow*|\downarrow\downarrow*\},$$

$$\diamond = \{\uparrow\uparrow\uparrow*|\downarrow\downarrow\downarrow*\}.$$

根據此八個基本盤面，可以再加以定義及推導出以下特性：

$$\text{令 } \uparrow^2 = \uparrow+ - \uparrow$$

根據 number 的特性，知  $\uparrow \gg \uparrow^2 > 0$ .

$$\uparrow/2 + \uparrow/2 = \uparrow$$

$$\uparrow/2 > \uparrow^2$$

$$\star + \star = 0$$

$$\star \parallel *(n), \text{ for integer } n > 0.$$

$$*/2 + */2 = *$$

令  $\triangle_*$  為  $(*/2)^+$  和  $*/2$  之間的差異

$$\triangle_* = (*/2)^+ - */2 > 0.$$

$$\diamond + \diamond = 0$$

### 2.3.2 3x3 大小子盤面的結果

根據所找出的八個基本盤面，則任何 3x3 大小內之子盤面和 S 可用以下公式來表示：

$$S = S_A + S_B + S_C.$$

而

$S_A$  代表  $\uparrow+$ 、 $\uparrow$ 、 $\uparrow/2$  的線性和

$S_B$  代表  $*$ 、 $\star$  的線性和

$S_C$  代表  $*/2$ 、 $\triangle_*$  的線性和

將  $S_B$  以及  $S_C$  所有可能的組合製成表，令 U 為 up 的組合，對應出所需要的 U，使得  $U + S_B + S_C > 0$ 。接著比較  $S_A$  和 U 的大小，就可以判斷 S 和 0 的大小關係。

根據 3x3 大小的 Chilled Domineering 研究[5]，無法找到一個簡單的規則能

對應盤面和對局值。但藉由定義微數字的新元素，例如 $\star$ 、 $\ast/2$ 、 $(\ast/2)^+$ 等元素，是有助於推導計算盤面對局值的，也對於組合對局的研究有更進一步的發展。



## 第三章、研究方法

本章節提出了以 Combinatorial Game Suite[12]為工具所建立的冷卻骨牌遊戲程式以及其子盤面的產生。3.1 章節會介紹這個程式，3-2 章節會介紹所產生的子盤面，3-3 節中介紹刪去未連接的子盤面過程，3-4 章節中描述刪去重覆子盤面的方法。

### 3.1 冷卻骨牌遊戲程式

本研究利用 Combinatorial Game Suite 此工具，建立了冷卻骨牌遊戲的操作程式，並可計算出冷卻骨牌遊戲的對局值(如圖 11)。此外也運用本工具提供的 Script language 建立了自動產生所有 3x3, 4x4 大小的冷卻骨牌遊戲子盤面程式。

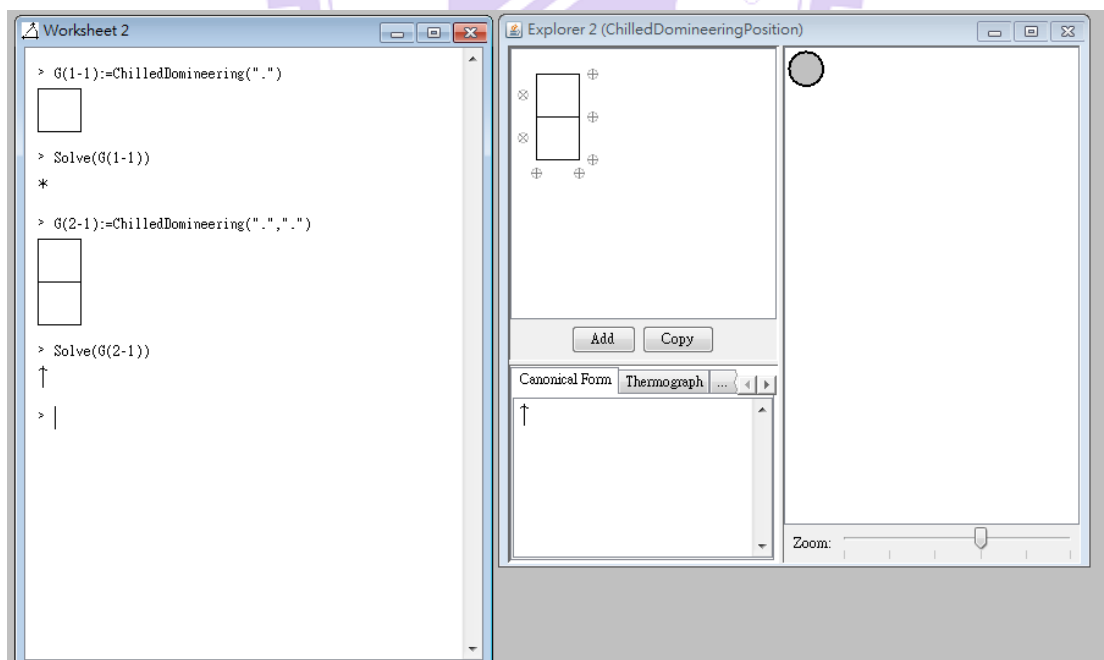


圖 11 利用 Combinatorial Game Suite 建立的冷卻骨牌遊戲程式

### 3.1.1 新定義的符號

在建立冷卻骨牌遊戲程式之後，修改 Combinatorial Game Suite 程式，使其輸出的結果包含[5]所提出的八個基本盤面值。

若盤面計算結果之值，兩倍後之和為零，則亦可將其用一新符號代表，以便簡化對局式。

## 3.2 冷卻骨牌程式產生的子盤面

利用 Combinatorial Game Suite 提供的 Script language 為工具，建立自動產生盤面以及計算盤面對局值的程式。

### 3.2.1 3x3 大小子盤面

從全滿盤面開始，產生一格為空、二格為空、三格為空，...到九格為空的所有子盤面。3x3 大小的子盤面一共有  $2^9=512$  種變化。

### 3.2.2 4x4 大小子盤面

和 3x3 大小的盤面做法一樣，從全滿盤面開始，依序產生一格為空、二格為空、三格為空，...到 16 格皆為空的所有盤面。4x4 大小的子盤面一共有  $2^{16}=65536$  種變化。

## 3.3 刪去未連接之子盤面

產生的  $m$  個空格子盤面中，若這  $m$  個空格都是連接在一起的則予以保留，若有分離的情況(如圖 12)，則可視為更小的獨立子盤面相加結果(如圖 13)而刪除，不產生此類盤面以避免重覆計算其對局值。

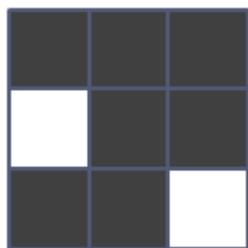


圖 12 沒有連接在一起的盤面

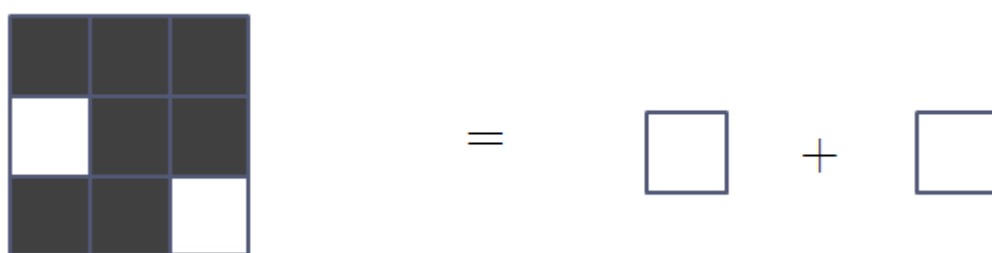


圖 13 沒有連接在一起的盤面可視為兩個獨立子盤面相加

### 3.4 刪去重覆之子盤面

在刪去所有未連接的盤面後，仍有許多盤面經過平移，旋轉、翻轉等動作後，可視為相同盤面，故也將之刪除不重覆計算。

總共有以下八種轉換：

1. 刪去平移後相同之盤面。
2. 刪去水平翻轉後相同之盤面。
3. 刪去垂直翻轉後相同之盤面。
4. 刪去順時鐘旋轉九十度後相同之盤面。
5. 刪去順時鐘旋轉一百八十度後相同之盤面。

6. 刪去逆時鐘旋轉九十度後相同之盤面(等同順時鐘旋轉 270 度)。
7. 刪去以對角線為中軸翻轉後相同之盤面(1)。
8. 刪去以對角線為中軸翻轉後相同之盤面(2)。

第一種轉換：

獨立盤面經平移後，並不會改變其對局值，因此將盤面平移到棋盤左上角，刪去平移後重複者。

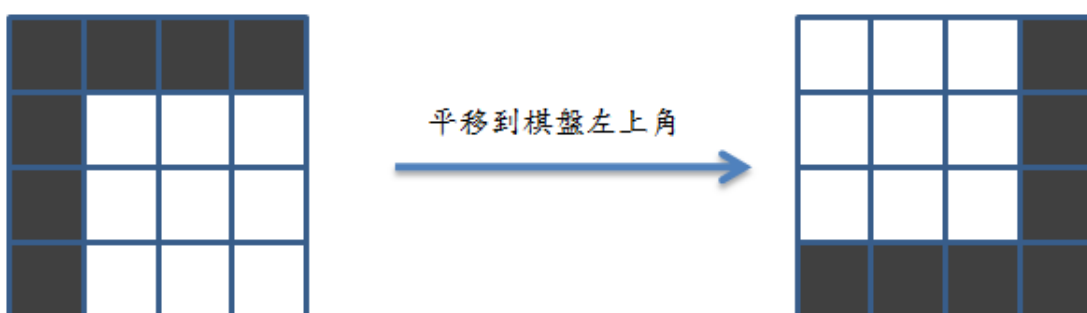


圖 14 平移到左上角

如圖 14，左方的盤面經平移到左上角後，發現平移後的盤面已經產生過，因此就不需再計算左方盤面之對局值。左方的盤面與右方的盤面視為同一種。

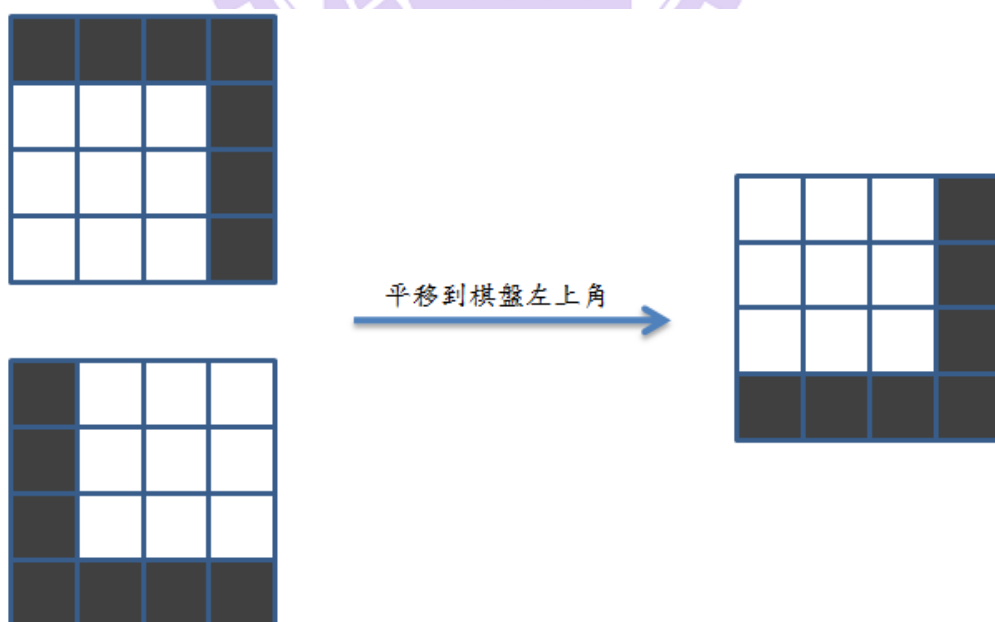


圖 15 平移到左上角(2)

圖 15 左方的兩個盤面平移到左上角後，亦和圖 14 右方的盤面相同，皆可

排除。

在將所有平移後相同之盤面排除後，接下來以已經平移到棋盤左上角之盤面為基準，開始做不同方式的翻轉旋轉。若翻轉、旋轉後盤面離開棋盤左上角，則將之再次移動到棋盤左上角進行比對。

第二種轉換：

獨立盤面經水平翻轉後，並不會改變其對局值，因此將盤面水平翻轉，刪去翻轉後重複者。



圖 16 水平翻轉

如圖 16，左方的盤面經水平翻轉後，發現水平翻轉後的盤面已經產生過，因此就不需再計算左方盤面之對局值。左方的盤面與右方的盤面視為同一種。

第三種轉換：

獨立盤面經垂直翻轉後，並不會改變其對局值，因此將盤面垂直翻轉，刪去翻轉後重複者。

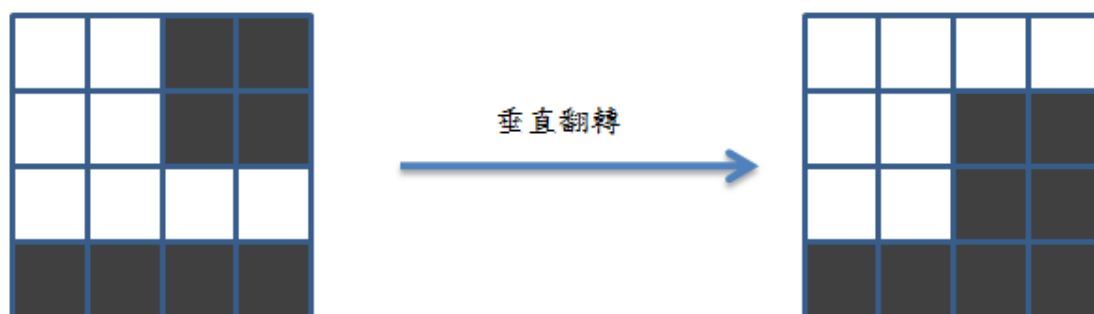


圖 17 垂直翻轉



如圖 17，左方的盤面經垂直翻轉後，發現垂直翻轉後的盤面已經產生過，因此就不需再計算左方盤面之對局值。左方的盤面與右方的盤面視為同一種。

第四種轉換：

獨立盤面在順時鐘旋轉九十度後，雖然對局值會改變，但對局值只是原本未旋轉前的盤面值的負數。因此我們也將這種盤面予以排除。

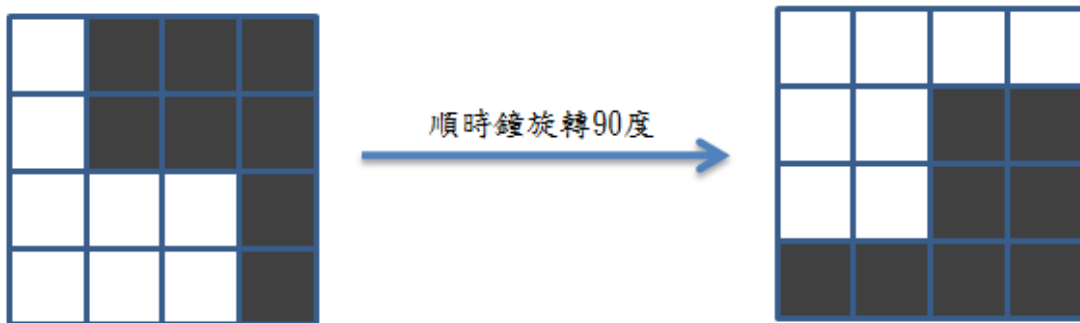


圖 18 順時鐘旋轉九十度

第五種轉換：

獨立盤面經順時鐘旋轉一百八十度後，並不會改變其對局值，因此將盤面順時鐘旋轉一百八十度後，刪去旋轉後重複者。

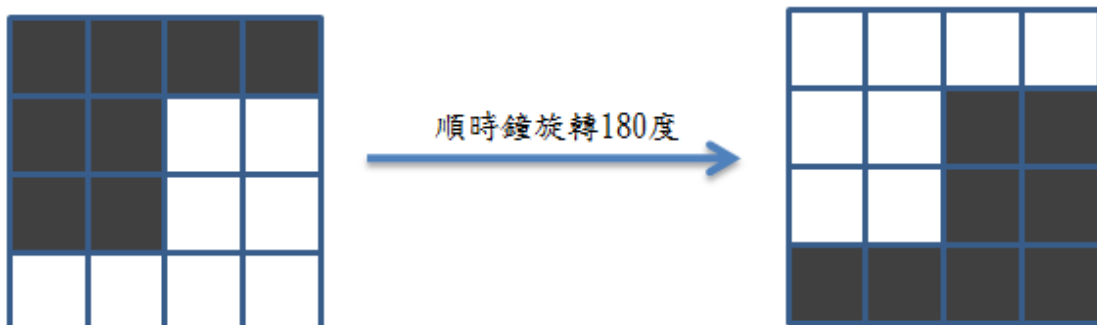


圖 19 順時鐘旋轉 180 度

第六種轉換：

獨立盤面在逆時鐘旋轉九十度後，雖然對局值會改變，但對局值只是原本未旋轉前的盤面值的負數。因此我們也將這種盤面予以排除。

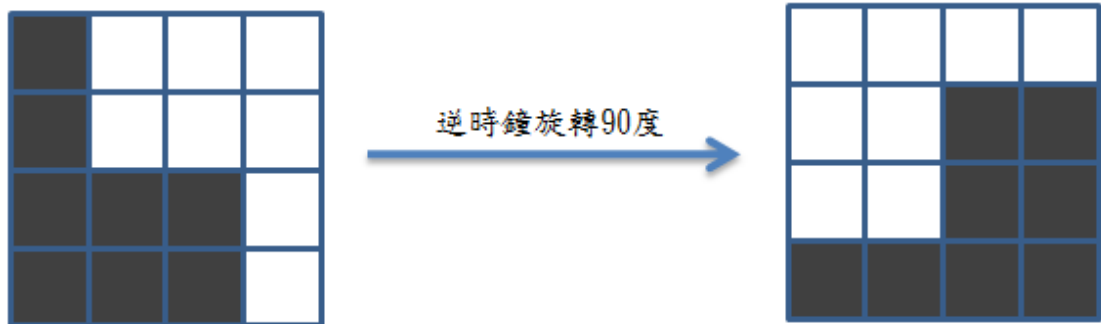


圖 20 逆時鐘旋轉九十度

第七種轉換：

將盤面的行列對調，得到轉置後的盤面。雖然對局值會改變，但對局值只是原本未轉置前的盤面值的負數。因此我們也將這種盤面予以排除。

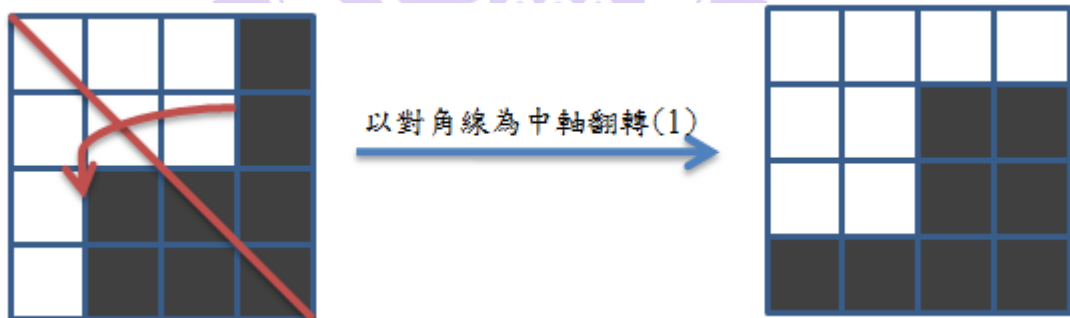


圖 21 轉置盤面

第八種轉換：

將盤面的行列對調，得到轉置後的盤面。雖然對局值會改變，但對局值只是原本未轉置前的盤面值的負數。因此我們也將這種盤面予以排除。

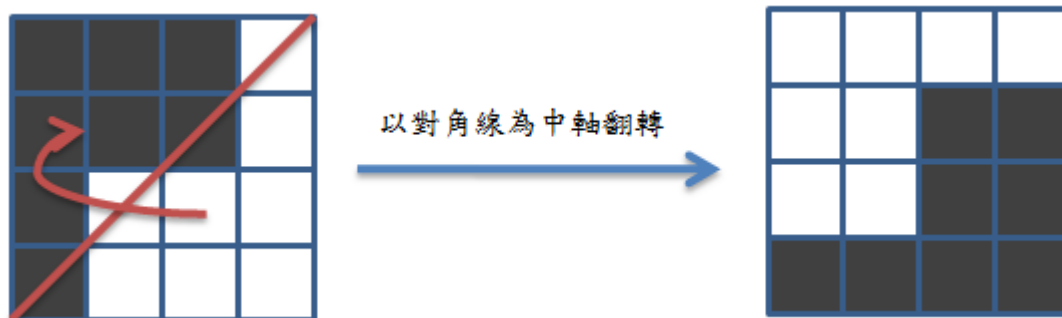


圖 22 以對角線為中軸翻轉



## 第四章、實驗

### 4.1 實驗環境

本程式使用一台雙核心的電腦，運算時脈 2.7GHz，記憶體為 2GB。

### 4.2 驗證 3x3 子盤面

本研究建立了冷卻骨牌遊戲的操作程式。一開始先產生所有 3x3 大小的子盤面，並驗證其數量及結果。

#### 4.2.1 3x3 子盤面數量

表 3 中列出 3x3 子盤面在盤面空格數量一到九的情況下，所產生的盤面數量；以及去除不連接盤面、重覆盤面後之數量。

| 盤面<br>空格數量 | 原始盤面數量 | 刪除不連接盤面後數量 | 刪除重覆盤面後數量 |
|------------|--------|------------|-----------|
| 0          | 1      | 1          | 1         |
| 1          | 9      | 9          | 1         |
| 2          | 36     | 12         | 1         |
| 3          | 84     | 22         | 2         |
| 4          | 126    | 36         | 4         |
| 5          | 126    | 49         | 7         |
| 6          | 84     | 48         | 8         |
| 7          | 36     | 32         | 7         |
| 8          | 9      | 9          | 3         |

|    |     |     |    |
|----|-----|-----|----|
| 9  | 1   | 1   | 1  |
| 總計 | 512 | 219 | 35 |

表 3 3x3 子盤面的數量

## 4.2.2 3x3 子盤面之值

將刪除重覆盤面後的所剩盤面，與[5]所提出的所有對局值做比較，均為正確無誤的。因此我們將再利用此程式，接著產生更大範圍的子盤面。

## 4.3 4x4 子盤面之值

### 4.3.1 4x4 子盤面數量

表 4 中列出 4x4 子盤面在盤面空格數量一到九的情況下，所產生的盤面數量；以及去除不連接盤面、重覆盤面後之數量。

| 盤面<br>空格數量 | 原始盤面數量 | 刪除不連接盤面後數量 | 刪除重覆盤面後數量 |
|------------|--------|------------|-----------|
| 0          | 1      | 1          | 1         |
| 1          | 16     | 16         | 1         |
| 2          | 120    | 24         | 1         |
| 3          | 560    | 52         | 2         |
| 4          | 1820   | 113        | 5         |
| 5          | 4368   | 244        | 9         |
| 6          | 8008   | 496        | 27        |
| 7          | 11440  | 912        | 68        |
| 8          | 12870  | 1474       | 143       |

|    |       |       |      |
|----|-------|-------|------|
| 9  | 11440 | 2032  | 224  |
| 10 | 8008  | 2286  | 283  |
| 11 | 4368  | 2000  | 245  |
| 12 | 1820  | 1236  | 165  |
| 13 | 560   | 488   | 68   |
| 14 | 120   | 116   | 20   |
| 15 | 16    | 16    | 3    |
| 16 | 1     | 1     | 1    |
| 總計 | 65536 | 11507 | 1265 |

表 4 4x4 子盤面的數量

### 4.3.2 4x4 子盤面之值分析

將 1265 種盤面的對局值(附錄 I)做分類，找出所有重複的對局值刪除後，發現總共仍有 612 種不同的對局值。

這 1265 個盤面中，對局值為\* 有 46 個，對局值☆ 有 11 個。這 57 個盤面對局值可以對應到[5]中所用的  $S_B$ 。

接著，將對局值確定為正值的找出來，共有 28 種。此種類之對局值可以對應到[5]中所用的  $S_A$ 。

雖然試著將每種對局值分類，但仍有許多盤面的對局值因為盤面的變化仍有很大的空間，所以對局值十分複雜。以空格 11 的某一個盤面(圖 23)為例，其對局值為  $\{\{\uparrow\uparrow\uparrow\uparrow\uparrow*\}\mid\downarrow\downarrow*\}$ ，在圖 24 為其對局樹的表示。

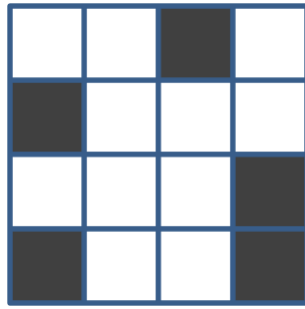


圖 23 空格 11 的某一個盘面

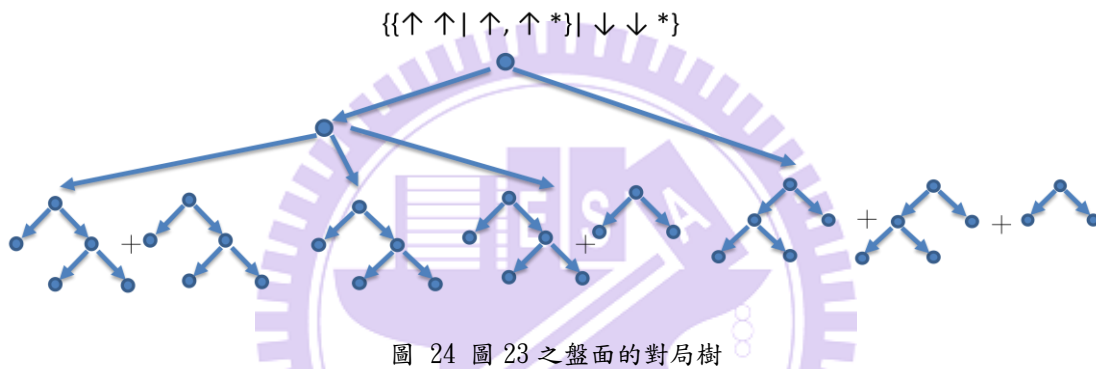


圖 24 圖 23 之盤面的對局樹

除了分析對局值的結果之外，也針對 612 種不同對局值之盘面原子重做計算以及分析。結果發現此 612 種不同對局值對應下的原子重只有 50 種。表 5 中列出了這 50 種對局值。

| Atomic Weight<br>種類 | Atomic Weight 值 | Atomic Weight<br>種類 | Atomic Weight 值 |
|---------------------|-----------------|---------------------|-----------------|
| 1                   | -2*             | 26                  | {0.5 0}         |
| 2                   | 2*              | 27                  | {*-1}           |
| 3                   | -1+{{1 0} 0}    | 28                  | {*-0.5}         |
| 4                   | -1^*            | 29                  | *               |
| 5                   | -1*             | 30                  | 4.00            |
| 6                   | 1*              | 31                  | 3.00            |
| 7                   | {-2 -3}         | 32                  | 2.50            |

|    |             |    |       |
|----|-------------|----|-------|
| 8  | {2 -1}      | 33 | 2.25  |
| 9  | {2 1}       | 34 | 2.00  |
| 10 | {2 1.5}     | 35 | 1.50  |
| 11 | {2 1*}      | 36 | 1.25  |
| 12 | {2 0}       | 37 | 1.00  |
| 13 | {2 0.5}     | 38 | 0.75  |
| 14 | {-1 -3}     | 39 | 0.50  |
| 15 | {-1 -2}     | 40 | 0.25  |
| 16 | {1 -2}      | 41 | 0.00  |
| 17 | {1 1},{1 0} | 42 | -0.25 |
| 18 | {1 0}       | 43 | -0.50 |
| 19 | {1 0.75}    | 44 | -1.00 |
| 20 | {1 0.5}     | 45 | -1.25 |
| 21 | {-1* -2}    | 46 | -1.50 |
| 22 | {0 -2}      | 47 | -2.00 |
| 23 | {0 -1}      | 48 | -2.50 |
| 24 | {-0.5 -2}   | 49 | -3.00 |
| 25 | {-0.5 -1}   | 50 | -4.00 |

表 5 4x4 子盤面，50 種不同的原子重

將 612 種對局值狀況，改由其所代表的 50 種原子重來計算，可幫助分析盤面對局結果。









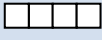






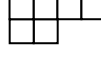

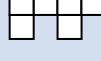
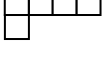
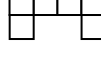
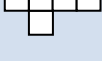
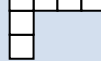
### 4.3.3 4x4 子盤面，七格空格以下之盤面狀況



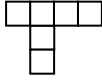




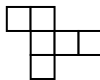

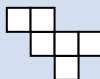
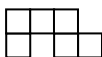



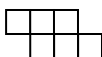


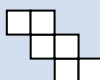


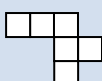

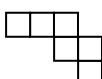
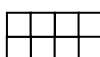
在表 6 中列出了 4x4 子盤面，七格空格以下的盤面情況與對局值、原子重。

在附錄 I 中列出了八格空格到十六格空格的盤面狀況與對局值、原子重。


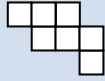
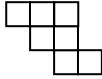
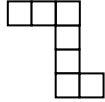

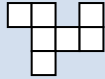
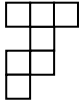
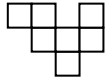
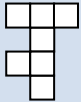
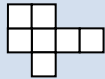
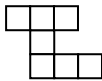
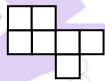
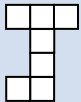
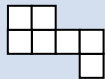
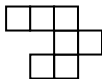

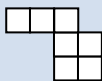
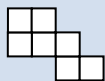
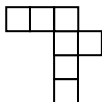
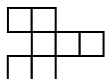
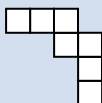
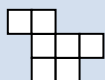
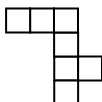
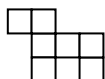


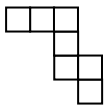
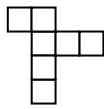
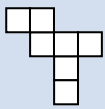
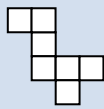
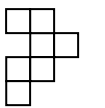
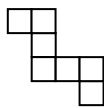
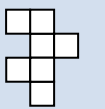
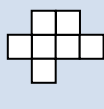
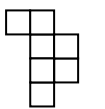

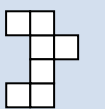
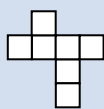
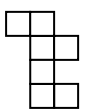
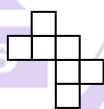
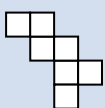
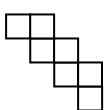
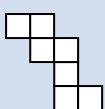
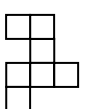
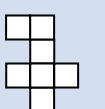
表 6 4x4 子盤面，七格空格以下之盤面狀況及對局值(Value)、原子重(Atomic Weight)

| No.              | Position  | Value     | Atomic Weight | No.               | Position   | Value                   | Atomic Weight |
|------------------|---|-----------|---------------|-------------------|--|-------------------------|---------------|
| P <sub>1-1</sub> |    | *         | 0             | P <sub>5-4</sub>  |     | ↑↑                      | 2             |
| P <sub>2-1</sub> |    | ↓         | -1            | P <sub>5-5</sub>  |     | *                       | 0             |
| P <sub>3-1</sub> |    | ↑         | 1             | P <sub>5-6</sub>  |     | ↑↑                      | 2             |
| P <sub>3-2</sub> |    | 0         | 0             | P <sub>5-7</sub>  |    | ↓↓                      | -2            |
| P <sub>4-1</sub> |    | *         | 0             | P <sub>5-8</sub>  |    | ↓                       | -1            |
| P <sub>4-2</sub> |  | ↓↓*       | -2            | P <sub>5-9</sub>  |   | ☆                       | 0             |
| P <sub>4-3</sub> |  | *         | 0             | P <sub>5-10</sub> |   | ↓↓                      | 0             |
| P <sub>4-4</sub> |  | *         | 0             | P <sub>6-1</sub>  |  | ↓*                      | 0             |
| P <sub>4-5</sub> |  | *         | 0             | P <sub>6-2</sub>  |  | 0                       | 0             |
| P <sub>5-1</sub> |  | {↑ 0, ↓*} | 0             | P <sub>6-3</sub>  |  | 0                       | 0             |
| P <sub>5-2</sub> |  | ↓↓        | -2            | P <sub>6-4</sub>  |  | ↓ <sub>2</sub> = {↑* 0} | 0             |

| No.               | Position  | Value  | Atomic Weight | No.               | Position   | Value   | Atomic Weight |
|-------------------|---|--|---------------|-------------------|--|---|---------------|
| P <sub>5-3</sub>  |    | ☆  | 0             | P <sub>6-5</sub>  |    | $\downarrow_{[2]}=\{*\downarrow\}$                        | -1            |
| P <sub>6-6</sub>  |    | $\{*,\downarrow 0\}$                             | -1            | P <sub>6-18</sub> |     | $\pm(*,\uparrow)=\{\uparrow, * \downarrow, *\}$           | 0             |
| P <sub>6-7</sub>  |    | $*/2=\{\uparrow\uparrow \downarrow\downarrow*\}$ | *             | P <sub>6-19</sub> |     | $*/2=\{\uparrow\uparrow \downarrow\downarrow*\}$          | *             |
| P <sub>6-8</sub>  |    | 0  | 0             | P <sub>6-20</sub> |    | $(\downarrow\downarrow*)_{[2]}=\{\downarrow\downarrow*\}$ | -2            |
| P <sub>6-9</sub>  |    | $\uparrow^{[2]}=\{\uparrow \*\}=\uparrow^+$      | 1             | P <sub>6-21</sub> |    | $\downarrow_{[2]}=\{*\downarrow\}$                        | -1            |
| P <sub>6-10</sub> |  | $\downarrow$                                     | -1            | P <sub>6-22</sub> |  | $\downarrow$  | -1            |
| P <sub>6-11</sub> |  | $\{\uparrow\uparrow* \downarrow*\}$              | 0.5           | P <sub>6-23</sub> |   | $\downarrow\downarrow^*$                                  | -2            |
| P <sub>6-12</sub> |  | 0  | 0             | P <sub>6-24</sub> |   | $\uparrow^*$  | 1             |
| P <sub>6-13</sub> |  | 0  | 0             | P <sub>6-25</sub> |  | $\{*\downarrow\downarrow\}$                               | -1            |
| P <sub>6-14</sub> |  | $\{\uparrow \downarrow*\}$                       | 0             | P <sub>6-26</sub> |   | 0   | 0             |
| P <sub>6-15</sub> |  | 0  | 0             | P <sub>6-27</sub> |   | 0   | 0             |
| P <sub>6-16</sub> |  | $\uparrow$                                       | 1             | P <sub>7-1</sub>  |  | $\{\uparrow \downarrow\downarrow\}$                       | -0.5          |

| No.               | Position | Value                   | Atomic Weight | No.               | Position | Value             | Atomic Weight |
|-------------------|----------|-------------------------|---------------|-------------------|----------|-------------------|---------------|
| P <sub>6-17</sub> |          | {↑*   ↓↓*}              | -0.5          | P <sub>7-2</sub>  |          | {↑↑ ↓, {↑ 0, ↓*}} | 0.5           |
| P <sub>7-3</sub>  |          | ↓3*=↓↓↓+*               | -3            | P <sub>7-15</sub> |          | {↑↑*, ↑↑ ↓↓}      | *             |
| P <sub>7-4</sub>  |          | ↓ <sub>[2]</sub> ={* ↓} | -1            | P <sub>7-16</sub> |          | ↓                 | -1            |
| P <sub>7-5</sub>  |          | {↑↑ ↓}                  | 0.5           | P <sub>7-17</sub> |          | ↑3*               | 3             |
| P <sub>7-6</sub>  |          | {0 ↑, ↑↑*}              | 2             | P <sub>7-18</sub> |          | ±↑↑={↑↑ ↓↓}       | *             |
| P <sub>7-7</sub>  |          | ↓                       | -1            | P <sub>7-19</sub> |          | ↓*                | -1            |
| P <sub>7-8</sub>  |          | ↓*                      | -1            | P <sub>7-20</sub> |          | ±↑↑               | *             |
| P <sub>7-9</sub>  |          | ±↑↑={↑↑ ↓↓}             | *             | P <sub>7-21</sub> |          | 0                 | 0             |
| P <sub>7-10</sub> |          | {↑↑ ↓}                  | 0.5           | P <sub>7-22</sub> |          | ↑*                | 1             |
| P <sub>7-11</sub> |          | ↓*                      | -1            | P <sub>7-23</sub> |          | 0                 | 0             |
| P <sub>7-12</sub> |          | ↓*                      | -1            | P <sub>7-24</sub> |          | ±↑↑               | *             |
| P <sub>7-13</sub> |          | {0, * ↓↓}               | -1            | P <sub>7-25</sub> |          | *                 | 0             |

| No.               | Position  | Value  | Atomic Weight | No.               | Position   | Value             | Atomic Weight |
|-------------------|---|--------|---------------|-------------------|--|-------------------|---------------|
| P <sub>7-14</sub> |    | ↓*     | -1            | P <sub>7-26</sub> |    | {↑ ↓↓}            | -0.5          |
| P <sub>7-27</sub> |    | {↑↑ ↓} | 0.5           | P <sub>7-39</sub> |    | ↑                 | 1             |
| P <sub>7-28</sub> |    | *      | 0             | P <sub>7-40</sub> |    | ↑                 | 1             |
| P <sub>7-29</sub> |    | ↑*     | 1             | P <sub>7-41</sub> |    | {↑ 0, *}          | 0             |
| P <sub>7-30</sub> |    | *      | 0             | P <sub>7-42</sub> |    | {*, ↓ ↓↓*, ↓↓}    | -1            |
| P <sub>7-31</sub> |  | {↑ ↓↓} | -0.5          | P <sub>7-43</sub> |  | {↑ ↓↓}            | -0.5          |
| P <sub>7-32</sub> |  | ↑3*    | 3             | P <sub>7-44</sub> |  | {↑↑ ↓, {↑ 0, ↓*}} | 0.5           |
| P <sub>7-33</sub> |  | {↑ ↓↓} | -0.5          | P <sub>7-45</sub> |  | *                 | 0             |
| P <sub>7-34</sub> |  | ±↑↑    | *             | P <sub>7-46</sub> |  | {↑ ↓↓}            | -0.5          |
| P <sub>7-35</sub> |  | ↑3*    | 3             | P <sub>7-47</sub> |  | ↓3                | -3            |
| P <sub>7-36</sub> |  | 0      | 0             | P <sub>7-48</sub> |  | {↑↑ ↓↓*, ↓↓}      | *             |
| P <sub>7-37</sub> |  | {↑ ↓↓} | -0.5          | P <sub>7-49</sub> |  | ↑                 | 1             |

| No.               | Position  | Value  | Atomic Weight | No.               | Position   | Value  | Atomic Weight |
|-------------------|---|--|---------------|-------------------|--|--|---------------|
| P <sub>7-38</sub> |    | $\pm\uparrow\uparrow$                            | *             | P <sub>7-50</sub> |    | 0  | 0             |
| P <sub>7-51</sub> |    | $\{\uparrow\uparrow \ast,\uparrow\}$             | 1             | P <sub>7-63</sub> |    | $\uparrow\ast$                               | 1             |
| P <sub>7-52</sub> |    | $\{0,\ast \downarrow\}$                          | 0             | P <sub>7-64</sub> |    | 0  | 0             |
| P <sub>7-53</sub> |    | *  | 0             | P <sub>7-65</sub> |    | $\downarrow_{[2]}\ast$                       | -1            |
| P <sub>7-54</sub> |    | $\{0,\{0,\uparrow\ast \downarrow\} \downarrow\}$ | 0             | P <sub>7-66</sub> |    | 0  | 0             |
| P <sub>7-55</sub> |  | $\downarrow\ast$                                 | -1            | P <sub>7-67</sub> |  | $\{\uparrow\uparrow \uparrow,\uparrow\ast\}$ | 2             |
| P <sub>7-56</sub> |  | $\downarrow\ast$                                 | -1            | P <sub>7-68</sub> |  | *  | 0             |
| P <sub>7-57</sub> |  | *  | 0             |                   |  |  |               |
| P <sub>7-58</sub> |  | *  | 0             |                   |  |  |               |
| P <sub>7-59</sub> |  | $\pm\uparrow\uparrow$                            | *             |                   |  |  |               |
| P <sub>7-60</sub> |  | $\downarrow$                                     | -1            |                   |  |  |               |
| P <sub>7-61</sub> |  | *  | 0             |                   |  |  |               |

| No.               | Position  | Value      | Atomic Weight | No. | Position | Value | Atomic Weight |
|-------------------|---|------------|---------------|-----|----------|-------|---------------|
| P <sub>7-62</sub> |  | {↓, ↓↓* 0} | -2            |     |          |       |               |



## 第五章、結論與未來展望

本篇研究運用 Combinatorial Game Suite 為工具，加入[5]所提出的八種基本元素於程式中。建立分析冷卻骨牌遊戲的對局值程式。

在建立了分析冷卻骨牌遊戲的對局值程式後，再產生了 3x3 以及 4x4 大小的所有冷卻骨牌遊戲子盤面；並藉由各種不同的翻轉、旋轉方法排除了重覆盤面後，大幅降低了所需要分析的盤面數量，大約降低到原本總數量的百分之二左右。

本篇研究也在產生了 3x3 大小的所有子盤面後，對[5]中所提出的對局值加以驗證。

在產生了這些對局盤面以及其對局值之後，本研究將所有對局值的種類進行分析比對：去除掉重複的對局值類型，並將不同的對局值對應到[5]所提出的線性公式中。

由實驗數據可知，盤面越大，代表盤面情況的對局式可能會越複雜，而無法再加以簡化。因此雖然本篇研究試著分類出 4x4 大小所有的冷卻骨牌盤面之對局值，但尚無法產生一線性公式計算不同子盤面總和的大小。

這也代表，組合對局理論雖然可以數學方法分析盤面，但其比較適合應用在盤面較小的區域，例如遊戲的終盤：可以被拆解成許多獨立區域，每個區域的大小也較為適當，產生的對局值較容易分析。

因此，在未來展望部分，可以試著擴充分析的要素：除了對局值之外，也加入其他分析的特點，例如遊戲雙方優勢的差距等。此外，雖然大型盤面的對局值

較為複雜，但也能藉此尋找新的基本元素，以改進計算對局值的方法，並更進一步研究組合對局理論。





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# 附錄 I

## 表示法

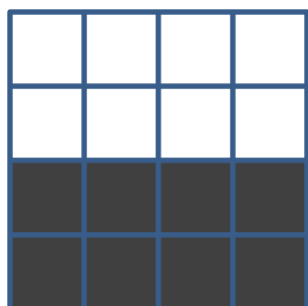
ChilledDomineering("....","....","xxxx","xxxx") 代表一個盤面

其中 x 代表已用的格子，.代表空格

" "中是一個 Row 的狀況，""的組數為 Row 數，""中的數量代表 Column 數，

以 ChilledDomineering("....","....","xxxx","xxxx")為例

代表的盤面是



^表示↑，v 表示↓

Pow(^,2)表示↑<sup>2</sup>，PowTo(v,2)表示↓<sub>[2]</sub>={\*|↓}

PowTo(^,2)= {↑\*}+↑

PowTo(^,3)= {{↑\*}|\*}

4x4 大小的八格空格盤面

| Num | Position  | Value                 | Atomic Weight |
|-----|---|-----------------------|---------------|
| 1   | ChilledDomineering("....","....","xxxx","xxxx") | Pow(v,2)              | 0             |
| 2   | ChilledDomineering("....","...x",".xxx","xxxx") | {v,+-(*,^) vv*}       | -1            |
| 3   | ChilledDomineering("....","...x","x.xx","xxxx") | {0,^* vv*,PowTo(v,2)} | -0.5          |
| 4   | ChilledDomineering("....","...x","xx.x","xxxx") | {^3* PowTo((vv*),2)}  | {1 0}         |
| 5   | ChilledDomineering("....",".x",".xxx","xxxx")   | {^^* +-(*,^),{^* v}}  | 1             |
| 6   | ChilledDomineering("....",".x","x.xx","xxxx")   | {0,^* +-(*,^),{^* v}} | 1             |
| 7   | ChilledDomineering("....",".x","xxx","xxxx")    | {^3* v}               | 1*            |
| 8   | ChilledDomineering("....",".xx",".xx","xxxx")   | 0                     | 0             |
| 9   | ChilledDomineering("....",".xx",".xxx",".xxx")  | 0                     | 0             |
| 10  | ChilledDomineering("....",".xx","x.x","xxxx")   | 0                     | 0             |
| 11  | ChilledDomineering("....",".xx","x.xx","x.xx")  | ^^                    | 2             |
| 12  | ChilledDomineering("....",".x.x",".xx","xxxx")  | vv                    | -2            |
| 13  | ChilledDomineering("....",".x.x",".x.x","xxxx") | ^                     | 1             |

|    |   |                                 |            |
|----|---|---------------------------------|------------|
| 14 | ChilledDomineering("....",".x.x",".xxx",".xxx") | $\{0,^* v\}$                    | 0          |
| 15 | ChilledDomineering("....",".x.x","x..x","xxxx") | $\{0,v^* vv^*\}$                | -1         |
| 16 | ChilledDomineering("....",".x.x","xx..","xxxx") | $\{0,v^* vv^*\}$                | -1         |
| 17 | ChilledDomineering("....",".x.x","xx.x","xx.x") | $\{0,^* v\}$                    | 0          |
| 18 | ChilledDomineering("....",".xx",".xx","xxxx")   | $\{\{^* v\},\{^* vv^*\} vv^*\}$ | -1         |
| 19 | ChilledDomineering("....",".xx",".xx","xxxx")   | $v^*$                           | -1         |
| 20 | ChilledDomineering("....",".xx",".xxx",".xxx")  | *                               | 0          |
| 21 | ChilledDomineering("....",".xxx","...x","xxxx") | $\{\wedge^3 v\}$                | $\{0 -1\}$ |
| 22 | ChilledDomineering("....",".xxx",".xx","x.xx")  | $\{\wedge,^* v^*,\{^* v\}\}$    | 0          |
| 23 | ChilledDomineering("....","x..x",".xx","xxxx")  | $vv$                            | -2         |
| 24 | ChilledDomineering("....","x..x","x..x","xxxx") | $\{*,v 0 1\}$                   | -2         |
| 25 | ChilledDomineering("....","x..x","x.xx","x.xx") | $\{0,^* v\}$                    | 0          |
| 26 | ChilledDomineering("....","x.xx","...x","xxxx") | $v$                             | -1         |
| 27 | ChilledDomineering("....","x.xx",".xx",".xxx")  | $\{\wedge^* vv^*\}$             | -0.5       |
| 28 | ChilledDomineering("....","x.xx",".xx","x.xx")  | $v$                             | -1         |
| 29 | ChilledDomineering("....","x.xx","x...","xxxx") | $\{^* v^3\}$                    | -1.5       |
| 30 | ChilledDomineering("....","x.xx","x..x","x.xx") | $v$                             | -1         |
| 31 | ChilledDomineering("....","x.xx","x..x","xx.x") | $\{\wedge^* vv^*\}$             | -0.5       |
| 32 | ChilledDomineering("....","x.xx","x.xx",".xx")  | $vv$                            | -2         |
| 33 | ChilledDomineering("....","x.xx","x.xx","x..x") | $vv$                            | -2         |
| 34 | ChilledDomineering("...x","....",".xxx","xxxx") | $\{0,+(-^*,^*) vv^*\}$          | -1         |
| 35 | ChilledDomineering("...x","....","x.xx","xxxx") | $\{\wedge^* v,vv^*\}$           | -0.5       |
| 36 | ChilledDomineering("...x","....","xx.x","xxxx") | $\{\wedge^* vv^*\}$             | -0.5       |
| 37 | ChilledDomineering("...x","....","xxx","xxxx")  | $\text{Pow}(v,2)$               | 0          |
| 38 | ChilledDomineering("...x","...x",".xx","xxxx")  | $\diamond$                      | -1         |
| 39 | ChilledDomineering("...x","...x",".x.x","xxxx") | *                               | 0          |
| 40 | ChilledDomineering("...x","...x","x.xx","x.xx") | $\{\wedge^{\wedge^*},^3 v^*\}$  | $1^*$      |
| 41 | ChilledDomineering("...x","...x","xx..","xxxx") | $\diamond$                      | -1         |
| 42 | ChilledDomineering("...x",".xx","x...","xxxx")  | $+-(\wedge^*)$                  | *          |
| 43 | ChilledDomineering("...x",".xx","x..x","x.xx")  | $\text{Pow}(\wedge,2)$          | 0          |
| 44 | ChilledDomineering("...x",".xx","x..x","xx.x")  | $\{0 ^\wedge,+(-^*,^\wedge)\}$  | 1          |
| 45 | ChilledDomineering("...x",".xx","x.xx",".xx")   | $\{0,^* vv^*\}$                 | -0.5       |
| 46 | ChilledDomineering("...x",".xx","x.xx","x..x")  | $\{0,^* vv^*\}$                 | -0.5       |
| 47 | ChilledDomineering("...x","x..",".xx","xxxx")   | $vv$                            | -2         |
| 48 | ChilledDomineering("...x","x..","x..x","xxxx")  | $\{\wedge^{\wedge^*} v\}$       | 0.5        |
| 49 | ChilledDomineering("...x","x..","xx","xxxx")    | $\{\wedge^3 v\}$                | $1^*$      |
| 50 | ChilledDomineering("...x","x..","x..x","xxxx")  | $vv$                            | -2         |

|    |   |   |       |
|----|---|---|-------|
| 51 | ChilledDomineering("...x",".x..","xx..","xxxx") | $\{v^*,\{\wedge^* v^*\} v^3\}$            | -1.25 |
| 52 | ChilledDomineering("...x",".x..","xx.x","xx.x") | 0   | 0     |
| 53 | ChilledDomineering("...x",".x..","xxx.","xxx.") | $\{\wedge^* v^*\}$                        | 0.5   |
| 54 | ChilledDomineering("...x",".x.x","...","xxxx")  | 0   | 0     |
| 55 | ChilledDomineering("...x",".x.x",".x.","xxxx")  | $\{0,\wedge^* v\}$                        | 0     |
| 56 | ChilledDomineering("...x",".x.x","x..","xxxx")  | $\wedge$                                  | 2     |
| 57 | ChilledDomineering("...x",".x.x","xx.","xx.x")  | $\wedge$                                  | 2     |
| 58 | ChilledDomineering("...x",".x.x","xx.","xxx.")  | $\wedge$                                  | 2     |
| 59 | ChilledDomineering("...x",".x.x","xx.x","xx.")  | $\{\wedge^* \{\wedge^* v^*\},\{^ v^*\}\}$ | 1     |
| 60 | ChilledDomineering("...x","x..",".xx","xxxx")   | $v^v$                                     | -2    |
| 61 | ChilledDomineering("...x","x..","x..x","xxxx")  | $\{\wedge^* 0,*\}$                        | 1     |
| 62 | ChilledDomineering("...x","x..","x..x","xxxx")  | $\wedge^3$                                | 3     |
| 63 | ChilledDomineering("...x","x..","x.xx","x.xx")  | $\uparrow^+*$                             | 1     |
| 64 | ChilledDomineering("...x","x..","xx.","xxxx")   | $\star$                                   | 0     |
| 65 | ChilledDomineering("...x","x..","xx.x","xx.x")  | $\wedge$                                  | 2     |
| 66 | ChilledDomineering("...x","x..","xxx.","xxx.")  | $\{\wedge^* 0,\wedge^*\}$                 | 1     |
| 67 | ChilledDomineering("...x","x..x","x..x","xxxx") | $\{0 +(*,\wedge)\}$                       | 1     |
| 68 | ChilledDomineering("...x","x..x","xx.","xx.x")  | $\{\wedge^* v^*\}$                        | 0.5   |
| 69 | ChilledDomineering("...x","x..x","xx.","xxx.")  | $\{\wedge^* \wedge,+(*,\wedge)\}$         | 1     |
| 70 | ChilledDomineering("...x","x..x","xx.x","xx.")  | $\{+(*,\wedge),\{^ v^*\} v^v\}$           | -1    |
| 71 | ChilledDomineering("...x","x.xx","...x",".xxx") | $\wedge$                                  | 1     |
| 72 | ChilledDomineering("...x","x.xx","...x","x.xx") | 0   | 0     |
| 73 | ChilledDomineering("...x","x.xx",".xx",".xx")   | $\{\wedge,\wedge^* \{^ v^*\} 0,v^*\}$     | 0     |
| 74 | ChilledDomineering("...x","x.xx",".xx","x..x")  | $v$                                       | -1    |
| 75 | ChilledDomineering("...x","x.xx","x..","x.xx")  | $v$                                       | -1    |
| 76 | ChilledDomineering("...x","x.xx","x..","xx.x")  | $\uparrow^+$                              | 1     |
| 77 | ChilledDomineering("...x","x.xx","x..","xxx.")  | $\wedge$                                  | 2     |
| 78 | ChilledDomineering("...x","x.xx","x..x","xx.")  | $\{\wedge,\wedge^* 0,v^*\}$               | 0.5   |
| 79 | ChilledDomineering("...x","x.xx","x.xx","...x") | $\wedge^3$                                | 3     |
| 80 | ChilledDomineering("...x","x.xx","x.xx","x..")  | $\wedge^*$                                | 1     |
| 81 | ChilledDomineering("...x","xx.","...x","xxxx")  | $v$                                       | -1    |
| 82 | ChilledDomineering("...x","xx.","x..x","x.xx")  | $+-(\wedge^*)$                            | *     |
| 83 | ChilledDomineering("...x","xx.","x..x","xx.x")  | $\{\wedge^* v^v\}$                        | -0.5  |
| 84 | ChilledDomineering("...x","xx.","xx.","xx.x")   | $\{\wedge,\wedge^* v^v\}$                 | *     |
| 85 | ChilledDomineering("...x","xx.","xx.x","x..x")  | $v$                                       | -1    |
| 86 | ChilledDomineering("...x","xx.","xx.x","xx.")   | $v$                                       | -1    |
| 87 | ChilledDomineering("...x","xx.x","x..","x.xx")  | $+-(\wedge^*)$                            | *     |

|     |   |  |        |
|-----|---|--|--------|
| 88  | ChilledDomineering("...x","xx.x","x...","xx.x") | $\{\wedge^* v^*\}$                               | -0.5   |
| 89  | ChilledDomineering("...x","xx.x","x...","xxx.") | $+-(\wedge^*)$                                   | *      |
| 90  | ChilledDomineering("...x","xx.x","x..x","xx..") | $\{*\wedge^*\}$                                  | -1.5   |
| 91  | ChilledDomineering("...x","xx.x","xx..","x..x") | $\{*\wedge^*\}$                                  | -1.5   |
| 92  | ChilledDomineering("...x","xx.x","xx..","xx..") | $\{\wedge^*v^*\}$                                | -1*    |
| 93  | ChilledDomineering("..x","...","x.xx","xxx")    | $\star$  | 0      |
| 94  | ChilledDomineering("..x","...","xx.x","xxx")    | $\{\wedge^* v^*\}$                               | 0.5    |
| 95  | ChilledDomineering("..x","x...",".xx","xxx")    | $vv$   | -2     |
| 96  | ChilledDomineering("..x","x...","x..x","xxx")   | $\{\wedge^3* v,vv^*\}$                           | {1 0}  |
| 97  | ChilledDomineering("..x","x...","x.xx","x.xx")  | 0  | 0      |
| 98  | ChilledDomineering("..x","x...","xx.x","xx.x")  | $\{\wedge^*\wedge^*,\wedge^*\}$                  | 2      |
| 99  | ChilledDomineering("..xx","...","x..x","xxx")   | $\{0,\wedge^* v^*,\text{PowTo}(v,2)\}$           | 0      |
| 100 | ChilledDomineering("..xx","...","x.x","xxx")    | $\star$  | 0      |
| 101 | ChilledDomineering("..xx","...","x.xx","x.xx")  | *  | 0      |
| 102 | ChilledDomineering("..xx","...","xx..","xxx")   | $\text{Pow}(v,2)$                                | 0      |
| 103 | ChilledDomineering("..xx","...","xx.x","xx.x")  | $\{\wedge^3*  v,0\}$                             | 1*     |
| 104 | ChilledDomineering("..xx","...x","xx..","xx.x") | $\{\wedge^*,\uparrow 10,v^*\}$                   | 0      |
| 105 | ChilledDomineering("..xx","...x","xx..","xxx.") | $\{\wedge^*,\{\wedge^* \}\wedge^*,v^*\}$         | 0      |
| 106 | ChilledDomineering("..xx","...x","xx.x","xx..") | $\{\wedge^3* \wedge^*,\{\wedge^* v^*\}\}$        | 1.25   |
| 107 | ChilledDomineering("..xx","x...",".xx","xxx")   | $\{v,v^* v^*\}$                                  | -2     |
| 108 | ChilledDomineering("..xx","x...",".xx","x.xx")  | $\{v^*,vv 0\}$                                   | -2     |
| 109 | ChilledDomineering("..xx","x...","x..x","x.xx") | $\{+-(\wedge^*,\wedge^*),\{\wedge^* v^*\} v^*\}$ | -1     |
| 110 | ChilledDomineering("..xx","x...","x..x","xx.x") | $+-(\wedge^*)$                                   | *      |
| 111 | ChilledDomineering("..xx","x...","x.x","x.xx")  | 0  | 0      |
| 112 | ChilledDomineering("..xx","x...","x.xx",".xx")  | $vv$   | -2     |
| 113 | ChilledDomineering("..xx","x...","x.xx","x..x") | $vv$   | -2     |
| 114 | ChilledDomineering("..xx","x...","xx..","xx.x") | $\{\wedge^* v^*\}$                               | -0.5   |
| 115 | ChilledDomineering("..xx","x...","xx.x","x..x") | $vv$   | -2     |
| 116 | ChilledDomineering("..xx","x...","xx.x","xx..") | $vv$   | -2     |
| 117 | ChilledDomineering("..xx","x..x","...x","xxx")  | $\{\wedge^*,\wedge^* v^3^*\}$                    | {0 -1} |
| 118 | ChilledDomineering("..xx","x..x","...x","x.xx") | $\text{Pow}(\wedge^*,2)$                         | 0      |
| 119 | ChilledDomineering("..xx","x..x",".xx","x..x")  | $v$  | -1     |
| 120 | ChilledDomineering("..xx","x..x","x...","x.xx") | $\{\wedge^*,\{\wedge^* v^*\} v^3^*\}$            | -1*    |
| 121 | ChilledDomineering("..xx","x..x","x...","xx.x") | $\{\wedge^* v^*\}$                               | 0.5    |
| 122 | ChilledDomineering("..xx","x..x","x...","xxx.") | $\diamond$                                       | -1     |
| 123 | ChilledDomineering("..xx","x..x","x..x",".xx")  | $\text{Pow}(\wedge^*,2)$                         | 0      |
| 124 | ChilledDomineering("..xx","x..x","x..x","xx..") | 0  | 0      |

|     |   |                       |     |
|-----|---|-----------------------|-----|
| 125 | ChilledDomineering("..xx","x..x","xx..","x..x") | {*  * vv}             | -1  |
| 126 | ChilledDomineering("..xx","x.x","x...","x.xx")  | {^^* 0,^*}            | 1   |
| 127 | ChilledDomineering("..xx","x.x","x...","xx.x")  | ^^                    | 2   |
| 128 | ChilledDomineering("..xx","x.xx","...",".xxx")  | 0                     | 0   |
| 129 | ChilledDomineering("..xx","x.xx","...","x.xx")  | {v*,vv 0}             | -2  |
| 130 | ChilledDomineering("..xx","x.xx","...","xx.x")  | vv                    | -2  |
| 131 | ChilledDomineering("..xx","x.xx","...","xxx.")  | {0,v* vv*}            | -1  |
| 132 | ChilledDomineering("..xx","x.xx","x...","x..x") | {+-(*,^),{^ v*} 0,v*} | -1  |
| 133 | ChilledDomineering("x..x","...","x..x","xxx")   | PowTo(vv,2)           | -2  |
| 134 | ChilledDomineering("x..x","...","x.xx","x.xx")  | {^^*  *,v 0}          | 0.5 |
| 135 | ChilledDomineering("x..x","...x","xx..","xx.x") | {^^* 0,v*}            | 0.5 |
| 136 | ChilledDomineering("x..x","..xx","x...","x.xx") | {v*,vv v3*}           | -2  |
| 137 | ChilledDomineering("x..x","..xx","x...","xx.x") | PowTo(v,3)            | -1  |
| 138 | ChilledDomineering("x..x","x.xx","...","x.xx")  | {v*,vv 0}             | -2  |
| 139 | ChilledDomineering("x..x","x.xx","...","xx.x")  | vv                    | -2  |
| 140 | ChilledDomineering("x.xx","...","x..x","x.xx")  | +-(^^*)               | *   |
| 141 | ChilledDomineering("x.xx","...","x..x","xx.x")  | +-(^^*)               | *   |
| 142 | ChilledDomineering("x.xx","..x","x...","xx.x")  | 0                     | 0   |
| 143 | ChilledDomineering("x.xx","x...","...x","xx.x") | +-(^^*)               | *   |

4x4 大小的九格空格盤面

| Num | Position                                       | Value                           | Atomic Weight |
|-----|--|---------------------------------|---------------|
| 1   | ChilledDomineering("...","...",".xxx","xxx")   | {^,^^* ^,^+-(*,^) v3*}          | -1*           |
| 2   | ChilledDomineering("...","...","x.xx","xxx")   | {^,{^,^^* ^,^+-(*,^)} 0,{^ vv}} | 0             |
| 3   | ChilledDomineering("...","...x",".xx","xxx")   | {^^* v3}                        | {0 -1}        |
| 4   | ChilledDomineering("...","...x",".x.x","xxx")  | 0                               | 0             |
| 5   | ChilledDomineering("...","...x",".xxx",".xxx") | {0,* v}                         | 0             |
| 6   | ChilledDomineering("...","...x","x..x","xxx")  | {0 ^,^^*  0 vv*}                | 0.5           |
| 7   | ChilledDomineering("...","...x","x.xx","x.xx") | {^,^3* v}                       | 1*            |
| 8   | ChilledDomineering("...","...x","xx..","xxx")  | vv*                             | -2            |
| 9   | ChilledDomineering("...","...x","xx.x","xx.x") | {^3* 0,{0,* vv}}                | 1*            |
| 10  | ChilledDomineering("...","..x",".xx","xxx")    | {^^*  0 vv*}                    | 0.5           |
| 11  | ChilledDomineering("...","..x",".xx","xxx")    | 0                               | 0             |
| 12  | ChilledDomineering("...","..x",".xxx",".xxx")  | {^3*,^3 ^,{^^ 0,*}}             | 2             |
| 13  | ChilledDomineering("...","..x","x..x","xxx")   | {0<2> vv*}                      | 0             |
| 14  | ChilledDomineering("...","..x","x.x","xxx")    | {^3 v*}                         | 1*            |
| 15  | ChilledDomineering("...","..x","x.xx","x.xx")  | {^,^3* ^,{^^ 0,*}}              | 2             |

|    |   |   |       |
|----|---|---|-------|
| 16 | ChilledDomineering("....","..x","xx","xxx")     | $\{0 v3\}$  | -1.5  |
| 17 | ChilledDomineering("....","..x","xxx","xxx.")   | $\{\wedge, \wedge^* *, \wedge, +-(*, \wedge) v^*\}$ | 0     |
| 18 | ChilledDomineering("....","..xx","...x","xxx")  | $\{\wedge^10, * lv3^*\}$                            | -1.5  |
| 19 | ChilledDomineering("....","..xx","..xx","x.xx") | $\{\wedge, \{\wedge^10, *\} 0, *\}$                 | 0     |
| 20 | ChilledDomineering("....","..xx","x..","xxx")   | $\{\wedge^1v3\}$                                    | -1*   |
| 21 | ChilledDomineering("....","..xx","x.x","x.xx")  | $\{0, \{\wedge^1vv\} vv\}$                          | -1    |
| 22 | ChilledDomineering("....","..xx","x.x","xx.x")  | $\{0, \{\wedge^10, *\} 0, *\}$                      | 0     |
| 23 | ChilledDomineering("....","..xx","x.xx","..xx") | $\{\wedge^1v3\}$                                    | -1*   |
| 24 | ChilledDomineering("....","..xx","x.xx","x.x")  | $\{\wedge^1v3\}$                                    | -1*   |
| 25 | ChilledDomineering("....",".x.x","...x","xxx")  | vv  | -2    |
| 26 | ChilledDomineering("....",".x.x","..xx","xxx")  | 0   | 0     |
| 27 | ChilledDomineering("....",".x.x","..xx","x.xx") | 0   | 0     |
| 28 | ChilledDomineering("....",".x.x",".x..","xxx")  | $\{*, \wedge^1v, v^*\}$                             | 0     |
| 29 | ChilledDomineering("....",".x.x","x.x","xxx")   | $\{\wedge^3 \wedge, \wedge^*\}$                     | 2     |
| 30 | ChilledDomineering("....",".x.x","x.x","xx.x")  | $\{\wedge^3 lv^*\}$                                 | {110} |
| 31 | ChilledDomineering("....",".x.x","xxx","..xx")  | 0   | 0     |
| 32 | ChilledDomineering("....",".x.x","x...","xxx")  | 0   | 0     |
| 33 | ChilledDomineering("....",".x.x","x..x","x.xx") | $\{0 \wedge, \wedge^* *\wedge, \wedge\}$            | 1     |
| 34 | ChilledDomineering("....",".x.x","x..x","xx.x") | 0   | 0     |
| 35 | ChilledDomineering("....",".x.x","xx..","xx.x") | 0   | 0     |
| 36 | ChilledDomineering("....",".x.x","xx..","xxx.") | $\{0 \wedge, \wedge^* *\wedge, \wedge\}$            | 1     |
| 37 | ChilledDomineering("....",".x.x","xx.x","x..x") | $\{\wedge^3* *\}$                                   | 1.5   |
| 38 | ChilledDomineering("....",".x.x","xx.x","xx..") | $\{\wedge^3* *\}$                                   | 1.5   |
| 39 | ChilledDomineering("....",".xx","...x","xxx")   | vv  | -2    |
| 40 | ChilledDomineering("....",".xx","..x","xxx")    | $\{\wedge^10, * 0\}$                                | -1    |
| 41 | ChilledDomineering("....",".xx","..xx","x.xx")  | 0   | 0     |
| 42 | ChilledDomineering("....",".xx","..xx","xxx")   | 0   | 0     |
| 43 | ChilledDomineering("....",".xx","xxx","..xx")   | $+-(*, \wedge)$                                     | 0     |
| 44 | ChilledDomineering("....",".xxx","...","xxx")   | 0   | 0     |
| 45 | ChilledDomineering("....",".xxx","...x","x.xx") | $\text{Pow}(v, 2)$                                  | 0     |
| 46 | ChilledDomineering("....",".xxx","...x","xx.x") | v   | -1    |
| 47 | ChilledDomineering("....",".xxx","..xx","x..x") | $\{\wedge^* *\wedge, v, +-(*, \wedge) v, vv^*\}$    | 0     |
| 48 | ChilledDomineering("....","x..x","...x","xxx")  | $\text{PowTo}(v, 2)$                                | -1    |
| 49 | ChilledDomineering("....","x..x","..xx","xxx")  | 0   | 0     |
| 50 | ChilledDomineering("....","x..x","..xx","x.xx") | $\text{PowTo}(v, 2)$                                | -1    |
| 51 | ChilledDomineering("....","x..x","x..x","x.xx") | 0   | 0     |
| 52 | ChilledDomineering("....","x..x","x.xx","..xx") | $\{*\wedge^1v\}$                                    | -1    |

|    |   |  |        |
|----|---|--|--------|
| 53 | ChilledDomineering("....","x..x","x.xx","x..x") | {* vv}                                 | -1     |
| 54 | ChilledDomineering("....","x.xx","....","xxx")  | vv*                                    | -2     |
| 55 | ChilledDomineering("....","x.xx","...x","xxx")  | {^ vv}                                 | -0.5   |
| 56 | ChilledDomineering("....","x.xx","...x","x.xx") | v*                                     | -1     |
| 57 | ChilledDomineering("....","x.xx","...x","xx.x") | {^ vv}                                 | -0.5   |
| 58 | ChilledDomineering("....","x.xx",".xx",".xx")   | {*,v,{0,* vv} v3}                      | -1.5   |
| 59 | ChilledDomineering("....","x.xx",".xx","x..x")  | vv*                                    | -2     |
| 60 | ChilledDomineering("....","x.xx","x..","x.xx")  | vv*                                    | -2     |
| 61 | ChilledDomineering("....","x.xx","x..","xx.x")  | {*,v vv}                               | -1     |
| 62 | ChilledDomineering("....","x.xx","x..","xxx.")  | PowTo(v,2)                             | -1     |
| 63 | ChilledDomineering("....","x.xx","x..x",".xx")  | vv*                                    | -2     |
| 64 | ChilledDomineering("....","x.xx","x..x","x..x") | {*,v,{0,* vv} v3}                      | -1.5   |
| 65 | ChilledDomineering("....","x.xx","x..x","xx..") | {*,v v3}                               | -1.5   |
| 66 | ChilledDomineering("....","x.xx","x.xx","...x") | 0                                      | 0      |
| 67 | ChilledDomineering("....","x.xx","x.xx","x..")  | 0                                      | 0      |
| 68 | ChilledDomineering("...x","....",".xx","xxx")   | {^^* v3*,v3}                           | {0 -1} |
| 69 | ChilledDomineering("...x","....",".x.x","xxx")  | 0                                      | 0      |
| 70 | ChilledDomineering("...x","....",".xx","xxx")   | {^,^^* ^,^+(*,^) v3*}                  | -1*    |
| 71 | ChilledDomineering("...x","....","x..x","xxx")  | {0,↑^+* v3}                            | -1*    |
| 72 | ChilledDomineering("...x","....","x.x","xxx")   | {^,{^,^^* ^,^+(*,^) 0,*}               | 0      |
| 73 | ChilledDomineering("...x","....","x.xx","x.xx") | {^ v}                                  | 0.5    |
| 74 | ChilledDomineering("...x","....","xx..","xxx")  | {*,{^,^^* ^,^+(*,^)} vv*,{*,v vv,vv*}} | -0.5   |
| 75 | ChilledDomineering("...x","....","xx.x","xx.x") | {^3 v}                                 | 1*     |
| 76 | ChilledDomineering("...x","....","xxx","xxx.")  | {^3 v3*}                               | -1     |
| 77 | ChilledDomineering("...x","...x","...x","xxx")  | 0                                      | 0      |
| 78 | ChilledDomineering("...x","...x",".x..","xxx")  | 0                                      | 0      |
| 79 | ChilledDomineering("...x","...x","x..","xxx")   | {^3 v*}                                | 1*     |
| 80 | ChilledDomineering("...x","...x","x.xx",".xx")  | {^ v,vv*}                              | *      |
| 81 | ChilledDomineering("...x","...x","xx..","xx.x") | {^3 vv*}                               | {1 0}  |
| 82 | ChilledDomineering("...x","...x","xx..","xxx.") | {^3 vv*}                               | {1 0}  |
| 83 | ChilledDomineering("...x","...x","xx.x","xx..") | {^^* 0 vv*}                            | -0.5   |
| 84 | ChilledDomineering("...x",".xx","x..","x.xx")   | {v,{v,vv* 0} 0}                        | -2     |
| 85 | ChilledDomineering("...x",".xx","x..","xx.x")   | {^ PowTo(v,2)+*}                       | 0      |
| 86 | ChilledDomineering("...x",".xx","x..","xxx.")   | Pow(^,2)                               | 0      |
| 87 | ChilledDomineering("...x",".xx","x..x",".xx")   | {^ vv}                                 | -0.5   |
| 88 | ChilledDomineering("...x",".xx","x..x","x..x")  | {^3* v,{*,v,+(*,^) v,vv*}}             | 1*     |
| 89 | ChilledDomineering("...x",".xx","x..x","xx..")  | {^,↑^+* v,{0 vv*},{*,v,+(*,^) v,vv*}}  | 0      |



|     |   |   |      |
|-----|---|---|------|
| 90  | ChilledDomineering("...x","..xx","x.xx","...x") | $\{\wedge^3 *\}$                                      | 1.5  |
| 91  | ChilledDomineering("...x","..xx","x.xx","x...") | $\{\wedge v^*\}$                                      | 0    |
| 92  | ChilledDomineering("...x",".x..","...x","xxx")  | 0   | 0    |
| 93  | ChilledDomineering("...x",".x..",".x..","xxx")  | $\wedge$  | 1    |
| 94  | ChilledDomineering("...x",".x..","..xx","x.xx") | 0   | 0    |
| 95  | ChilledDomineering("...x",".x..",".x..","xxx")  | $\{\wedge^* v^*\}$                                    | 0.5  |
| 96  | ChilledDomineering("...x",".x..",".x.x","xx.x") | $\{\wedge^3 \wedge^*\}$                               | 2    |
| 97  | ChilledDomineering("...x",".x..",".xx","xxx.")  | $\wedge\wedge$  | 2    |
| 98  | ChilledDomineering("...x",".x..","x.x","x.xx")  | $\{*,v vv^*\}$  | -1   |
| 99  | ChilledDomineering("...x",".x..","x.x","xx.x")  | v   | -1   |
| 100 | ChilledDomineering("...x",".x..","xx..","xx.x") | $\{\wedge^* vv^*\}$                                   | -0.5 |
| 101 | ChilledDomineering("...x",".x..","xx..","xxx.") | v   | -1   |
| 102 | ChilledDomineering("...x",".x..","xx.x","x..x") | PowTo(v,2)  | -1   |
| 103 | ChilledDomineering("...x",".x..","xx.x","xx..") | PowTo(v,2)  | -1   |
| 104 | ChilledDomineering("...x",".x..","xxx","xx..")  | $\pm(\wedge,\wedge^*)$                                | *    |
| 105 | ChilledDomineering("...x",".x.x",".x..","xx.x") | $\{\wedge^* v^*\}$                                    | 0.5  |
| 106 | ChilledDomineering("...x",".x.x",".x..","xxx.") | $\{\wedge^* v^*\}$                                    | 0.5  |
| 107 | ChilledDomineering("...x",".x.x",".x.x","xx..") | $\wedge\wedge$  | 2    |
| 108 | ChilledDomineering("...x",".x.x","x...","x.xx") | $\wedge^3^*$  | 3    |
| 109 | ChilledDomineering("...x",".x.x","x...","xx.x") | $\wedge^*\wedge$                                      | 2    |
| 110 | ChilledDomineering("...x",".x.x","x...","xxx.") | $\wedge^3^*$  | 3    |
| 111 | ChilledDomineering("...x",".x.x","x..x","xx..") | $\wedge^*$  | 1    |
| 112 | ChilledDomineering("...x",".x.x","xx..","x..x") | $\wedge^*$  | 1    |
| 113 | ChilledDomineering("...x",".x.x","xx..","xx..") | $\{\wedge^3 0\}$                                      | 1.5  |
| 114 | ChilledDomineering("...x",".x.x","xx.x","x...") | $\{\wedge,\wedge^3 \{0,\wedge^* v\},\{\wedge^* v\}\}$ | 1.5  |
| 115 | ChilledDomineering("...x","x...","...x","xxx")  | 0   | 0    |
| 116 | ChilledDomineering("...x","x...",".x..","xxx")  | 0   | 0    |
| 117 | ChilledDomineering("...x","x...",".xx","xxx")   | 0   | 0    |
| 118 | ChilledDomineering("...x","x...","..xx","x.xx") | 0   | 0    |
| 119 | ChilledDomineering("...x","x...","x..x","x.xx") | 0   | 0    |
| 120 | ChilledDomineering("...x","x...","x..x","xx.x") | $\{\wedge,\wedge^3 *\}$                               | 1.5  |
| 121 | ChilledDomineering("...x","x...","x.x","x.xx")  | $\{\wedge^3 \wedge^*,\{0,\wedge^* v\}\}$              | 1.5  |
| 122 | ChilledDomineering("...x","x...","x.x","xxx.")  | $\{\wedge^* *\}$                                      | 1    |
| 123 | ChilledDomineering("...x","x...","x.xx",".xx")  | 0   | 0    |
| 124 | ChilledDomineering("...x","x...","x.xx","x..x") | 0   | 0    |
| 125 | ChilledDomineering("...x","x...","xx..","xx.x") | $\{\wedge^3 *\}$                                      | 1.5  |
| 126 | ChilledDomineering("...x","x...","xx..","xxx.") | 0   | 0    |

|     |   |                              |      |
|-----|---|------------------------------|------|
| 127 | ChilledDomineering("...x","x...","xx.x","x..x") | 0                            | 0    |
| 128 | ChilledDomineering("...x","x...","xx.x","xx..") | 0                            | 0    |
| 129 | ChilledDomineering("...x","x..x","x...","x.xx") | {PowTo(^(^,2) PowTo(v,2)+*}  | 0.5  |
| 130 | ChilledDomineering("...x","x..x","x...","xx.x") | {^ v*,☆}                     | 1    |
| 131 | ChilledDomineering("...x","x..x","x...","xxx.") | {^3 v*}                      | 1*   |
| 132 | ChilledDomineering("...x","x..x","x..x","xx..") | {0, ↑ +*  *,v,+-(*,^) v,vv*} | 0    |
| 133 | ChilledDomineering("...x","x..x","x.xx","x...") | {^ v*}                       | 0    |
| 134 | ChilledDomineering("...x","x..x","xx..","x..x") | {*,^ vv}                     | -0.5 |
| 135 | ChilledDomineering("...x","x..x","xx..","xx..") | {^3*  *,v,+-(*,^) v,vv*}     | 1*   |
| 136 | ChilledDomineering("...x","x..x","xx.x","x...") | 0                            | 0    |
| 137 | ChilledDomineering("...x","x.xx","...",".xxx")  | *                            | 0    |
| 138 | ChilledDomineering("...x","x.xx","...","x.xx")  | v*                           | -1   |
| 139 | ChilledDomineering("...x","x.xx","...","xx.x")  | Pow(v,2)                     | 0    |
| 140 | ChilledDomineering("...x","x.xx","...","xxx.")  | 0                            | 0    |
| 141 | ChilledDomineering("...x","x.xx","...x",".xx")  | {^,^* *,v}                   | 0    |
| 142 | ChilledDomineering("...x","x.xx","...x",".x.x") | ^^*                          | 2    |
| 143 | ChilledDomineering("...x","x.xx","...x","xx..") | {^* v}                       | 0    |
| 144 | ChilledDomineering("...x","x.xx","..xx","x...") | ^                            | 1    |
| 145 | ChilledDomineering("...x","x.xx","x...",".xx")  | vv*                          | -2   |
| 146 | ChilledDomineering("...x","x.xx","x...","x..x") | {^*,☆,{0,^* v} v}            | 0    |
| 147 | ChilledDomineering("...x","x.xx","x...","x..x") | {^ v*,^}                     | 1    |
| 148 | ChilledDomineering("...x","x.xx","x...","xx..") | {^3 ^,{^ vv}}                | 1.25 |
| 149 | ChilledDomineering("...x","xx..","...x",".xxx") | {^* v}                       | 0    |
| 150 | ChilledDomineering("...x","xx..","...x","x.xx") | {^* vv}                      | -0.5 |
| 151 | ChilledDomineering("...x","xx..","...x","xx.x") | PowTo(v,2)+*                 | -1   |
| 152 | ChilledDomineering("...x","xx..","x...","x.xx") | {^3 v,v*}                    | 1*   |
| 153 | ChilledDomineering("...x","xx..","x...","xx.x") | {^*,^ vv}                    | *    |
| 154 | ChilledDomineering("...x","xx..","x..x",".xx")  | {^* v3}                      | -1*  |
| 155 | ChilledDomineering("...x","xx..","x..x","x..x") | {^3* v3}                     | -1   |
| 156 | ChilledDomineering("...x","xx..","x..x","xx..") | {0 v3}                       | -1.5 |
| 157 | ChilledDomineering("...x","xx..","xx..","x..x") | {^,^* v3}                    | -1*  |
| 158 | ChilledDomineering("...x","xx..","xx.x","...x") | {^^* v*}                     | 0.5  |
| 159 | ChilledDomineering("...x","xx.x","...",".xxx")  | {^* v,vv*}                   | -0.5 |
| 160 | ChilledDomineering("...x","xx.x","...","x.xx")  | {^* vv,vv*}                  | -0.5 |
| 161 | ChilledDomineering("...x","xx.x","...","xx.x")  | {0 v3}                       | -1.5 |
| 162 | ChilledDomineering("...x","xx.x","...","xxx.")  | {^ v3}                       | -1*  |
| 163 | ChilledDomineering("...x","xx.x","...x","xx..") | vv*                          | -2   |

|     |   |   |       |
|-----|---|---|-------|
| 164 | ChilledDomineering("...x","xx.x","x...",".xx")      | $\{\wedge^* vv^*,v3\}$  | -1*   |
| 165 | ChilledDomineering("...x","xx.x","x...","x..x")     | $\{\wedge^* vv^*,v3\}$  | -1*   |
| 166 | ChilledDomineering("...x","xx.x","x...","x.x.")     | $\{\wedge^3 v\}$  | 1*    |
| 167 | ChilledDomineering("...x","xx.x","x...","xx..")     | $\{\wedge^* vv^*,v3\}$  | -1*   |
| 168 | ChilledDomineering("..x.", "...", "x..x", "xxxx")   | $\{*,\wedge,\{\wedge,\wedge^* *,\wedge,+(-*,\wedge)\}\{*,v,+(-*,\wedge) v,vv^*\},\{\wedge^0,\{\wedge^0,v^*\}\}\}$ | 0     |
| 169 | ChilledDomineering("..x.", "...", "x.xx", "x.xx")   | $\uparrow^+*$   | 1     |
| 170 | ChilledDomineering("..x.", "...", "xx.x", "xx.x")   | $\{\wedge^3 0\}$  | 1.5   |
| 171 | ChilledDomineering("..x.", "x...", ".xx", ".xxx")   | $\{*,\wedge^0,v^*\}$  | 0     |
| 172 | ChilledDomineering("..x.", "x...", ".xx", "x.xx")   | $\{*,v 0\}$   | -1    |
| 173 | ChilledDomineering("..x.", "x...", "x..x", "x.xx")  | $\{\wedge^* 0<2>\}$   | 0     |
| 174 | ChilledDomineering("..x.", "x...", "x..x", "xx.x")  | $\{\wedge^3 0,v^*\}$  | 1*    |
| 175 | ChilledDomineering("..x.", "x...", "x.xx", ".xx")   | v   | -1    |
| 176 | ChilledDomineering("..x.", "x...", "x.xx", "x..x")  | v   | -1    |
| 177 | ChilledDomineering("..x.", "x...", "xx.x", "x..x")  | $\{0,\wedge^* *,v\}$  | 0     |
| 178 | ChilledDomineering("..xx", "...", "x..x", "x.xx")   | $+(-*,\wedge)$  | 0     |
| 179 | ChilledDomineering("..xx", "...", "x..x", "xx.x")   | $\{\wedge^* vv\}$   | *     |
| 180 | ChilledDomineering("..xx", "...", "x..x", "x.xx")   | $\uparrow^+*$   | 1     |
| 181 | ChilledDomineering("..xx", "...", "xx..", "xx.x")   | $\{\wedge,\{\wedge,\wedge^* *,\wedge,+(-*,\wedge)\} 0,*\}$  | 0     |
| 182 | ChilledDomineering("..xx", "...", "xx.x", "x..x")   | $vv^*$  | -2    |
| 183 | ChilledDomineering("..xx", "...", "xx.x", "xx..")   | $vv^*$  | -2    |
| 184 | ChilledDomineering("..xx", "...", "x...", "xx.x")   | $+(-*,\wedge)$  | 0     |
| 185 | ChilledDomineering("..xx", "...", "x...", "xxx.")   | $\{\wedge^* vv^*\}$   | *     |
| 186 | ChilledDomineering("..xx", "...", "xx..", "x..x")   | $\{0,\{0,* v\} vv\}$  | -1    |
| 187 | ChilledDomineering("..xx", "...", "xx..", "xx..")   | $+(-*,\{\wedge,\wedge^* *,\wedge,+(-*,\wedge)\})$   | 0     |
| 188 | ChilledDomineering("..xx", "x...", ".x...", ".xxx") | $\{0,\wedge^* v3\}$   | -1*   |
| 189 | ChilledDomineering("..xx", "x...", ".x...", "x.xx") | $\{*,v vv\}$  | -1    |
| 190 | ChilledDomineering("..xx", "x...", ".x...", "xx.x") | $\{\wedge^* v3\}$   | -1*   |
| 191 | ChilledDomineering("..xx", "x...", ".x...", ".xxx") | $\{*,\wedge^0,v^*\}$  | 0     |
| 192 | ChilledDomineering("..xx", "x...", ".x...", "x.xx") | $\{*,v 0\}$   | -1    |
| 193 | ChilledDomineering("..xx", "x...", ".xx", "x..x")   | $vv^*$  | -2    |
| 194 | ChilledDomineering("..xx", "x...", "x...", "x.xx")  | $\{\wedge^* 0  v,vv^* 0\}$  | -0.5  |
| 195 | ChilledDomineering("..xx", "x...", "x...", "xx.x")  | $\{\wedge^3 v^*,PowTo(vv,2)\}$  | {1 0} |
| 196 | ChilledDomineering("..xx", "x...", "x..x", ".xx")   | $\{*\wedge^3\}$   | -1.5  |
| 197 | ChilledDomineering("..xx", "x...", "x..x", "x..x")  | $\{*,\{\wedge^* *,\wedge\} v3\}$  | -1*   |
| 198 | ChilledDomineering("..xx", "x...", "x..x", "xx..")  | $\{\wedge^* v3\}$   | -1*   |
| 199 | ChilledDomineering("..xx", "x...", "x..x", ".xx")   | v   | -1    |

|     |   |  |        |
|-----|---|--|--------|
| 200 | ChilledDomineering("..xx", "x..", "x.x.", "x..x") | v  | -1     |
| 201 | ChilledDomineering("..xx", "x..", "xx.", "x..x")  | {0,+ <sup>^</sup>  v3}                             | -1.5   |
| 202 | ChilledDomineering("..xx", "x..x", "...", "xxx")  | {0<2> vv*}   | 0      |
| 203 | ChilledDomineering("..xx", "x..x", "...", "x.xx") | {*,v v3}   | -1.5   |
| 204 | ChilledDomineering("..xx", "x..x", "...", "xx.x") | vv*  | -2     |
| 205 | ChilledDomineering("..xx", "x..x", "...", "xxx.") | vv*  | -2     |
| 206 | ChilledDomineering("..xx", "x..x", "x..", "x..x") | {*, <sup>^</sup>  v,v*}                            | 0      |
| 207 | ChilledDomineering("..xx", "x.x.", "...", ".xxx") | ^  | 1      |
| 208 | ChilledDomineering("..xx", "x.x.", "...", "x.xx") | 0  | 0      |
| 209 | ChilledDomineering("..xx", "x.x.", "...", "xx.x") | vv*  | -2     |
| 210 | ChilledDomineering("..xx", "x.x.", "x..", "x..x") | { <sup>^</sup> * 0<2>}                             | 0      |
| 211 | ChilledDomineering("..xx", "x.xx", "...", ".x.x") | {0 *, <sup>^</sup> }                               | 1      |
| 212 | ChilledDomineering("..xx", "x.xx", "...", ".xx.") | ^  | 1      |
| 213 | ChilledDomineering("..xx", "x.xx", "...", "x..x") | {*,v v}  | -1     |
| 214 | ChilledDomineering("..xx", "x.xx", "...", "x.x.") | 0  | 0      |
| 215 | ChilledDomineering("x..x", "...", ".xx", "x.xx")  | +-( <sup>+</sup> , <sup>+</sup> +*)                | 0      |
| 216 | ChilledDomineering("x..x", "...", ".x.x", "xx.x") | { <sup>^</sup> 3  <sup>^</sup> , <sup>^</sup> *}   | 2      |
| 217 | ChilledDomineering("x..x", "...", "x..x", "x.xx") | +-( <sup>^</sup> , <sup>+</sup> +*)                | 0      |
| 218 | ChilledDomineering("x..x", "...", "x.xx", "x..x") | {*,v v}  | -1     |
| 219 | ChilledDomineering("x..x", "...", ".x.", "xx.x")  | { <sup>^</sup> 3 0,v*}                             | 1*     |
| 220 | ChilledDomineering("x..x", "...", "x..", "x.xx")  | {PowTo( <sup>^</sup> ,2) v3}                       | {0 -1} |
| 221 | ChilledDomineering("x..x", "...", "x..", "xx.x")  | { <sup>^</sup>  *,v}                               | 0.5    |
| 222 | ChilledDomineering("x..x", "...", "xx.", "x..x")  | {*, <sup>^</sup>  v,v*}                            | 0      |
| 223 | ChilledDomineering("x..x", ".x.x", "...", "xx.x") | 0  | 0      |
| 224 | ChilledDomineering("x..x", "x..x", "...", "x.xx") | { <sup>^</sup>   <sup>^</sup> , <sup>^</sup> * v3} | {0 -1} |

4x4 大小的 10 格空格盘面

| Num | Position   | Value  | Atomic Weight |
|-----|--|--|---------------|
| 1   | ChilledDomineering("....", "....", ".xx", "xxxx")  | { <sup>^</sup>  vv*,{{ <sup>^</sup> * v},{ <sup>^</sup> * vv*} vv*}}   | *             |
| 2   | ChilledDomineering("....", "....", ".x.x", "xxxx") | {{ <sup>^</sup> * +-(*, <sup>^</sup> ),{ <sup>^</sup> * v}},{ <sup>^</sup> *, <sup>^</sup>  0, <sup>^</sup> *,☆} v3} | -1*           |
| 3   | ChilledDomineering("....", "....", ".xx.", "xxxx") | vv*  | -2            |
| 4   | ChilledDomineering("....", "....", ".xxx", ".xxx") | { <sup>^</sup> * vv}   | *             |
| 5   | ChilledDomineering("....", "....", "x..x", "xxxx") | {{0, <sup>^</sup> * +-(*, <sup>^</sup> ),{ <sup>^</sup> * v}},{ <sup>^</sup> 3* v} v}                                | 0             |
| 6   | ChilledDomineering("....", "....", "x.xx", "x.xx") | { <sup>^</sup> * *, <sup>^</sup> }   | 1             |
| 7   | ChilledDomineering("....", "...x", "...x", "xxxx") | {{0, <sup>^</sup> * v},{0 +-(*, <sup>^</sup> )}{v,+-(*, <sup>^</sup> ) vv*},{* v3*}}                                 | 0             |

|    |   |   |           |
|----|---|---|-----------|
| 8  | ChilledDomineering("....","...x","..xx",".xxx") | $+^{-\wedge}$   | *         |
| 9  | ChilledDomineering("....","...x","..xx","x.xx") | $+^{-\wedge}$   | *         |
| 10 | ChilledDomineering("....","...x",".x..","xxxx") | $\{v^*,vv,\{0,v^*,\star v^*,vv\} vv\}$                        | -2        |
| 11 | ChilledDomineering("....","...x",".x.x",".xxx") | $\uparrow^{+*}$   | 1         |
| 12 | ChilledDomineering("....","...x",".x.x","xx.x") | $\{\wedge3 0,\{0,* vv^*\}\}$                                  | 1*        |
| 13 | ChilledDomineering("....","...x",".xxx",".xx")  | $\{\star,\{0,* v\} vv\}$                                      | -1        |
| 14 | ChilledDomineering("....","...x","x...","xxxx") | $\{*,\wedge vv\}$   | -0.5      |
| 15 | ChilledDomineering("....","...x","x.x","x.xx")  | $\{\wedge 0,\{\wedge 0,v^*\}\}$                               | 1         |
| 16 | ChilledDomineering("....","...x","x.x","xx.x")  | $\{\wedge,\{\wedge* 0,+(-*,\wedge) v,\{\wedge 0,v^*\}\}\}$    | 0         |
| 17 | ChilledDomineering("....","...x","x.xx",".xx")  | $\{\wedge v^*,vv\}$   | -0.5      |
| 18 | ChilledDomineering("....","...x","x.xx","x..x") | $\{\wedge v^*,vv\}$   | -0.5      |
| 19 | ChilledDomineering("....","...x","xx..","xx.x") | $\{\wedge v^*,vv 0\}$   | -0.5      |
| 20 | ChilledDomineering("....","...x","xx..","xxx.") | $\{\wedge\wedge v,v^* vv^*\}$                                 | *         |
| 21 | ChilledDomineering("....","...x","xx.x","x..x") | $\{\wedge vv\}$   | -0.5      |
| 22 | ChilledDomineering("....","...x","xx.x","xx..") | $\{\wedge vv\}$   | -0.5      |
| 23 | ChilledDomineering("....",".x.",".x.",".xxx")   | $\{\wedge\wedge \star,\{\wedge 0,*\}\}$                       | 1         |
| 24 | ChilledDomineering("....",".x.",".x.",".xxx")   | $\{\wedge4 PowTo(v,2)\}$                                      | $\{2 1\}$ |
| 25 | ChilledDomineering("....",".x.",".xx","x.xx")   | $\{\wedge\wedge \{\wedge 0,v^*\},\star\}$                     | 1         |
| 26 | ChilledDomineering("....",".x.",".x.",".xxx")   | $\{*,v vv\}$  | -1        |
| 27 | ChilledDomineering("....",".x.",".xx.",".xxx")  | $\{\wedge3 \wedge,\wedge^*\}$                                 | 2         |
| 28 | ChilledDomineering("....",".x.",".xx.",".xxx.") | $\{0,*  *,v,+(-*,\wedge) v,vv^*\}$                            | 0         |
| 29 | ChilledDomineering("....",".x.",".xxx",".xx")   | $+^{-\wedge}$   | *         |
| 30 | ChilledDomineering("....",".x.",".x...",".xxx") | $v^*$   | -1        |
| 31 | ChilledDomineering("....",".x.",".x.x","x.xx")  | $\{\wedge\wedge v,\{\wedge 0,v^*\}\}$                         | 0.5       |
| 32 | ChilledDomineering("....",".x.",".x.x","xx.x")  | $\{\wedge\wedge \{\wedge 0,v^*\},\star\}$                     | 1         |
| 33 | ChilledDomineering("....",".x.",".x.x","x.xx")  | $\{\wedge3,\wedge4* \wedge^*,\{\wedge^* \wedge,\wedge\}\}$    | 2.5       |
| 34 | ChilledDomineering("....",".x.",".x.x",".xxx.") | $\{PowTo(\wedge,2) \wedge^*,v,+(-*,\wedge) v,vv^*\}$          | 0.5       |
| 35 | ChilledDomineering("....",".x.",".x.xx",".xx")  | $\{\wedge,\{\wedge^* \{\wedge^* v^*\},\{\wedge v^*\}\} vv\}$  | -0.5      |
| 36 | ChilledDomineering("....",".x.",".x.xx","x..x") | $\{\wedge,\{\wedge^* \{\wedge^* v^*\},\{\wedge v^*\}\} vv\}$  | -0.5      |
| 37 | ChilledDomineering("....",".x.",".xx.",".xx.x") | $\wedge^*$  | 1         |
| 38 | ChilledDomineering("....",".x.",".xx.",".xxx.") | $\{\wedge\wedge v\}$  | 0.5       |
| 39 | ChilledDomineering("....",".x.",".xxx",".xx..") | $\{\wedge,\{\wedge^* \{\wedge^* v^*\},\{\wedge v^*\}\} *,v\}$ | 0         |
| 40 | ChilledDomineering("....",".xx",".x.",".xxx")   | $\{PowTo(v,2) 0\}$  | -2        |
| 41 | ChilledDomineering("....",".xx",".x.",".xx")    | $\{Pow(v,2) v3\}$   | -1.5      |
| 42 | ChilledDomineering("....",".xx",".x.",".xx.x")  | $\{\wedge^* \wedge^*,\wedge v3\}$                             | -1*       |
| 43 | ChilledDomineering("....",".xx",".xx",".x..x")  | $\{PowTo(v,2) 0\}$  | -2        |
| 44 | ChilledDomineering("....",".xx",".x.",".xx")    | $\{v,vv^* PowTo((v3^*),2)\}$                                  | -2        |

|    |   |                             |       |
|----|---|-----------------------------|-------|
| 45 | ChilledDomineering("....",".xx","x..","xx.x")   | {* PowTo(vv,2)}             | -1    |
| 46 | ChilledDomineering("....",".xx","x..","xxx.")   | {0,{^ 0,v*} 0,PowTo(v,2)+*} | -1    |
| 47 | ChilledDomineering("....",".xx","x..x",".xx")   | {*,{* v3*} v3*}             | -1.5  |
| 48 | ChilledDomineering("....",".xx","x..x","x..x")  | {^ v^v*}                    | *     |
| 49 | ChilledDomineering("....",".xx","x..x","xx..")  | {*  v* v3}                  | -1    |
| 50 | ChilledDomineering("....",".xx","x.xx","...x")  | {^* v}                      | 0     |
| 51 | ChilledDomineering("....",".xx","x.xx","x..")   | {^* vv}                     | -0.5  |
| 52 | ChilledDomineering("....",".x.x","...","xxx")   | vv*                         | -2    |
| 53 | ChilledDomineering("....",".x.x","...x",".xxx") | +^-^                        | *     |
| 54 | ChilledDomineering("....",".x.x","...x","x.xx") | ^^*                         | 2     |
| 55 | ChilledDomineering("....",".x.x","...x","xx.x") | {*,v vv}                    | -1    |
| 56 | ChilledDomineering("....",".x.x",".xx","x..x")  | v*                          | -1    |
| 57 | ChilledDomineering("....",".x.x","x..",".xxx")  | {^ v3}                      | -1*   |
| 58 | ChilledDomineering("....",".x.x","x..","xx.x")  | {^ v}                       | 0.5   |
| 59 | ChilledDomineering("....",".x.x","x..","xxx.")  | {^ v}                       | 0.5   |
| 60 | ChilledDomineering("....",".x.x","x..x",".xx")  | ^^*                         | 2     |
| 61 | ChilledDomineering("....",".x.x","x..x","x..x") | *                           | 0     |
| 62 | ChilledDomineering("....",".x.x","x..x","x..x") | ^^*                         | 2     |
| 63 | ChilledDomineering("....",".x.x","x..x","xx..") | ^^*                         | 2     |
| 64 | ChilledDomineering("....",".x.x",".xxx","...x") | 0                           | 0     |
| 65 | ChilledDomineering("....",".x.x","x..","x.xx")  | {^ 0,v*}                    | 0     |
| 66 | ChilledDomineering("....",".x.x","x..","xx.x")  | *                           | 0     |
| 67 | ChilledDomineering("....",".x.x","x..","xxx.")  | {^ 0,v*}                    | 0     |
| 68 | ChilledDomineering("....",".x.x","x..x",".xx")  | {0 ^*,^ v,{0,v* vv*}}       | 0.5   |
| 69 | ChilledDomineering("....",".x.x","x..x","x..x") | {^ 0,{0,v* vv*}}            | 0     |
| 70 | ChilledDomineering("....",".x.x","x..x","xx..") | v*                          | -1    |
| 71 | ChilledDomineering("....",".x.x","xx..","x..x") | v*                          | -1    |
| 72 | ChilledDomineering("....",".x.x","xx..","xx..") | {^ 0,{0,v* vv*}}            | 0     |
| 73 | ChilledDomineering("....",".x.x","xx.x","...x") | 0                           | 0     |
| 74 | ChilledDomineering("....",".x.x","xx.x","x..")  | {0  0 ^*,^ v}               | 3     |
| 75 | ChilledDomineering("....",".xx","...","xxx")    | v3*                         | -3    |
| 76 | ChilledDomineering("....",".xx","...x","x.xx")  | {v*,{^ 0,v*} 0}             | -1    |
| 77 | ChilledDomineering("....",".xx","...x","xx.x")  | 0                           | 0     |
| 78 | ChilledDomineering("....",".xx","..x","x.xx")   | {^ v* ^ v*}                 | 0     |
| 79 | ChilledDomineering("....",".xx","..x","xxx.")   | {^ v* ^ v3}                 | -1.25 |
| 80 | ChilledDomineering("....",".xx",".xx","x..x")   | {v*,{^ 0,v*} 0}             | -1    |
| 81 | ChilledDomineering("....",".xx",".xx",".xx")    | 0                           | 0     |

|     |  |   |      |
|-----|--|---|------|
| 82  | ChilledDomineering("....",".xx",".xx",".xx.")      | $\{0,* 0,\{0,* vv\}\}$                                  | 0    |
| 83  | ChilledDomineering("....",".xxx","....",".x.xx")   | $\text{PowTo}((vv^*),2)$                                | -2   |
| 84  | ChilledDomineering("....",".xxx","....",".xx.x")   | $v^*$   | -1   |
| 85  | ChilledDomineering("....",".xxx","....",".xxx.")   | $\{\wedge 0,*  0\}$                                     | 0    |
| 86  | ChilledDomineering("....",".xxx",".x",".x.x")      | $\{\wedge,\wedge^* *,\wedge,+(-(*,\wedge)  0,*\}$       | 0    |
| 87  | ChilledDomineering("....",".xxx",".x",".xx.")      | $v^*$   | -1   |
| 88  | ChilledDomineering("....",".xxx",".xx",".x..")     | $vv^*$  | -2   |
| 89  | ChilledDomineering("....",".x..x","....",".xxxx")  | $vv^*$  | -2   |
| 90  | ChilledDomineering("....",".x..x",".x",".xxx")     | $\{*,\{0  0,v^* 0,*\} vv\}$                             | -1   |
| 91  | ChilledDomineering("....",".x..x",".x",".x.xx")    | *   | 0    |
| 92  | ChilledDomineering("....",".x..x",".x",".xx.x")    | $\{v,v^* v3\}$  | -2   |
| 93  | ChilledDomineering("....",".x..x",".xx",".xx")     | $\{0,\{0,\wedge^* v\}  \text{PowTo}(vv,2)\}$            | -1   |
| 94  | ChilledDomineering("....",".x..x",".xx",".x..x")   | $\{0 vv^*\}$  | -1   |
| 95  | ChilledDomineering("....",".x..x",".x..x",".xxx")  | $\{\wedge^* v^*   *,v 0  0\}$                           | -1   |
| 96  | ChilledDomineering("....",".x..x",".x..x",".x..x") | $\{v,\{0,\wedge^* v\}  \text{PowTo}(vv,2)\}$            | -1   |
| 97  | ChilledDomineering("....",".x..x",".xx",".x..x")   | $\{\wedge^3 v\}$  | 1*   |
| 98  | ChilledDomineering("....",".x..x",".xx",".x..x")   | $\{\wedge^* vv\}$                                       | -0.5 |
| 99  | ChilledDomineering("....",".x.xx","....",".xxx")   | $\{*,\{*\} v3^*\} v3^*\}$                               | -1.5 |
| 100 | ChilledDomineering("....",".x.xx","....",".x.xx")  | $vv$  | -2   |
| 101 | ChilledDomineering("....",".x.xx","....",".xx.x")  | $\{0 vv^*\}$  | -1   |
| 102 | ChilledDomineering("....",".x.xx","....",".xxx.")  | $\text{PowTo}(v,2)+^*$                                  | -1   |
| 103 | ChilledDomineering("....",".x.xx",".x",".xx")      | $\{0,v^*,\{0,v^*,\wedge^* v^*,vv\} vv,v3^*\}$           | -1.5 |
| 104 | ChilledDomineering("....",".x.xx",".x",".x.x")     | $\{\wedge^* v^*\}$                                      | 0.5  |
| 105 | ChilledDomineering("....",".x.xx",".x",".x.x")     | $\{0,v^*,\{0,v^*,\wedge^* v^*,vv\} vv,v3^*\}$           | -1.5 |
| 106 | ChilledDomineering("....",".x.xx",".x",".xx.")     | $\{0 v3^*\}$  | -1.5 |
| 107 | ChilledDomineering("....",".x.xx",".xx",".x..x")   | $\{v^*,vv 0\}$  | -2   |
| 108 | ChilledDomineering("....",".x.xx",".xx",".x..")    | *   | 0    |
| 109 | ChilledDomineering("....",".x.xx",".x..",".xx")    | $v3$  | -3   |
| 110 | ChilledDomineering("....",".x.xx",".x..",".x..x")  | $\{0,\{0,* vv^*\},\{0,v^*,\wedge^* v^*,vv\} v3^*\}$     | -1.5 |
| 111 | ChilledDomineering("....",".x.xx",".x..",".x..x")  | $\{0,\wedge^* v,v^*\}$                                  | 0    |
| 112 | ChilledDomineering("....",".x.xx",".x..",".xx.")   | $\{0  0,v^* 0,*   vv\}$                                 | -1   |
| 113 | ChilledDomineering("....",".x.xx",".x..",".x..x")  | $\{v^*,vv 0\}$  | -2   |
| 114 | ChilledDomineering("....",".x.xx",".x..",".x..")   | $v^*$   | -1   |
| 115 | ChilledDomineering("....",".x.xx",".x..",".x..")   | $\{\wedge^*  \wedge^* vv^*\}$                           | 0    |
| 116 | ChilledDomineering("....",".x.xx",".xx",".x..")    | $v^*$   | -1   |
| 117 | ChilledDomineering("...x","....",".x",".xxxx")     | $\{\wedge,\{\wedge^* v\} v,\{0,+(-(*,\wedge) vv^*)\}\}$ | 0    |
| 118 | ChilledDomineering("...x","....",".x",".xxxx")     | $\{\wedge^3 \text{Pow}(v,2)\}$                          | 1.5  |

|     |   |   |            |
|-----|---|---|------------|
| 119 | ChilledDomineering("...x", "...", ".xx", "x.xx")    | $+-(^{\wedge}, \uparrow^{\dagger}+^*)$  | *          |
| 120 | ChilledDomineering("...x", "...", ".x.", "xxx")     | $+-(^*, ^{\wedge})$   | 0          |
| 121 | ChilledDomineering("...x", "...", ".x.x", "xx.x")   | $\wedge^*$  | 2          |
| 122 | ChilledDomineering("...x", "...", ".xx.", "xxx.")   | $\{^{\wedge} v^*\}$   | 0          |
| 123 | ChilledDomineering("...x", "...", ".x...", "xxx")   | $\{\text{PowTo}(\wedge^{\wedge}, 2) v4\}$   | $\{0 -2\}$ |
| 124 | ChilledDomineering("...x", "...", ".x.x", "x.xx")   | $\{^{\wedge}3 vv\}$   | $\{1 0\}$  |
| 125 | ChilledDomineering("...x", "...", ".x.x", "xx.x")   | $+^{-\wedge}$   | *          |
| 126 | ChilledDomineering("...x", "...", ".x.x", "x.xx")   | $\wedge$  | 1          |
| 127 | ChilledDomineering("...x", "...", ".x.x", "xxx.")   | $\{^{\wedge}3* v3\}$  | -1         |
| 128 | ChilledDomineering("...x", "...", ".x.xx", ".xx")   | $\{^{\wedge} vv\}$  | -0.5       |
| 129 | ChilledDomineering("...x", "...", ".x.xx", "x.x")   | $\{^{\wedge} vv\}$  | -0.5       |
| 130 | ChilledDomineering("...x", "...", ".xx.", "xx.x")   | $\{\text{PowTo}(\wedge^{\wedge}, 2) vv\}$   | *          |
| 131 | ChilledDomineering("...x", "...", ".xx.", "xxx.")   | $\{^{\wedge} vv\}$  | -0.5       |
| 132 | ChilledDomineering("...x", "...", ".xx.x", "x.x")   | $\{^{\wedge} vv\}$  | -0.5       |
| 133 | ChilledDomineering("...x", "...", ".xx.x", "xx.")   | $\{^{\wedge} vv\}$  | -0.5       |
| 134 | ChilledDomineering("...x", "...", ".xxx.", "xx.")   | $\{^{\wedge}  \{^{\wedge}* v\}, \{^{\wedge}* vv^*\} vv^*\}$   | 0.5        |
| 135 | ChilledDomineering("...x", "...x", ".x.", "xx.x")   | $\{^{\wedge} 0, *\}$  | 0          |
| 136 | ChilledDomineering("...x", "...x", ".x.", "xxx.")   | $+-(^*, ^{\wedge})$   | 0          |
| 137 | ChilledDomineering("...x", "...x", ".x.x", "xx.")   | $\{\star, \{0, * vv\} vv\}$   | -1         |
| 138 | ChilledDomineering("...x", "...x", ".x...", "x.xx") | $\{^{\wedge}3, \text{PowTo}(\wedge^{\wedge}3, 2) v4\}$  | $\{1 -2\}$ |
| 139 | ChilledDomineering("...x", "...x", ".x...", "xx.x") | $\{^{\wedge}, \wedge^3* vv\}$   | $\{1 0\}$  |
| 140 | ChilledDomineering("...x", "...x", ".x...", "xxx.") | $\{\text{PowTo}(\wedge^{\wedge}, 2), \text{PowTo}(\wedge^{\wedge}3, 2) v4\}$                        | $\{1 -2\}$ |
| 141 | ChilledDomineering("...x", "...x", ".x.x", "xx.")   | $\{^{\wedge}^{\wedge}, \{^{\wedge}^{\wedge}* \{^{\wedge}^{\wedge}* v^*\}, \{^{\wedge} v^*\}\} vv\}$ | *          |
| 142 | ChilledDomineering("...x", "...x", ".x.xx", "...x") | $\{^{\wedge}^{\wedge}, \wedge^3 vv\}$   | $\{1 0\}$  |
| 143 | ChilledDomineering("...x", "...x", ".x.xx", "x...") | $\{^{\wedge}3 v4\}$   | $\{1 -2\}$ |
| 144 | ChilledDomineering("...x", "...x", ".xx.", "x.x")   | $\{^{\wedge}^{\wedge}* vv\}$  | *          |
| 145 | ChilledDomineering("...x", "...x", ".xx.", "xx.")   | $\{^{\wedge}^{\wedge}* vv\}$  | *          |
| 146 | ChilledDomineering("...x", "...x", ".xx.x", "x...") | $\{^{\wedge}^{\wedge}*  vv\}$   | -0.5       |
| 147 | ChilledDomineering("...x", "...xx", ".x...", ".xx") | $\{v^*, vv v3^*\}$  | -2         |
| 148 | ChilledDomineering("...x", "...xx", ".x...", "x.x") | $\{^{\wedge}3 \{0, ^{\wedge}* vv^*\}, \{0, v^*, \star v^*, vv\}\}$                                  | $1^*$      |
| 149 | ChilledDomineering("...x", "...xx", ".x...", "x.x") | $\{^{\wedge}3* ^{\wedge}, ^{\wedge}\}$  | 2          |
| 150 | ChilledDomineering("...x", "...xx", ".x...", "xx.") | $\wedge^*$  | 1          |
| 151 | ChilledDomineering("...x", "...xx", ".x.x", "...x") | 0   | 0          |
| 152 | ChilledDomineering("...x", "...xx", ".x.x", "x...") | $\{^{\wedge}3 v^*, \text{Pow}(\wedge, 2)\}$   | $1^*$      |
| 153 | ChilledDomineering("...x", "...xx", ".x.x", "x...") | $\{^{\wedge}3* ^*\}$  | 1.5        |
| 154 | ChilledDomineering("...x", ".x.", "...x", "x.xx")   | $+-(^{\wedge}, \{^{\wedge}^{\wedge}* v\})$  | 0          |
| 155 | ChilledDomineering("...x", ".x.", "...x", "xx.x")   | $\{*, v 0\}$  | -1         |



|     |  |  |            |
|-----|--|--|------------|
| 156 | ChilledDomineering("...x", ".x.", ".x.", "x.xx")   | $\wedge^*$   | 1          |
| 157 | ChilledDomineering("...x", ".x.", ".x.", "xxx.")   | 0  | 0          |
| 158 | ChilledDomineering("...x", ".x.", ".x.", "xx.x")   | $\{\wedge^* *,v,+(-*,\wedge) v,vv^*\}$   | 0.5        |
| 159 | ChilledDomineering("...x", ".x.", ".x.", "xxx.")   | $\{\wedge^* *,v,+(-*,\wedge) v,vv^*\}$   | 0.5        |
| 160 | ChilledDomineering("...x", ".x.", ".x.x", "x.x")   | $\{\wedge^* v3\}$  | $\{0 -1\}$ |
| 161 | ChilledDomineering("...x", ".x.", ".x.x", "xx.")   | $\{\wedge^* v3\}$  | $\{0 -1\}$ |
| 162 | ChilledDomineering("...x", ".x.", ".xx.", "xx.")   | $\{\wedge^* v3\}$  | $\{2 -1\}$ |
| 163 | ChilledDomineering("...x", ".x.", "x...", "x.xx")  | $\{\wedge^* v4\}$  | $\{0 -2\}$ |
| 164 | ChilledDomineering("...x", ".x.", "x...", "xx.x")  | $+-\wedge^*$   | *          |
| 165 | ChilledDomineering("...x", ".x.", "x...", "xxx.")  | $\{^* v4\}$  | $-2^*$     |
| 166 | ChilledDomineering("...x", ".x.", "x.x", "xx")     | $v^*$  | -1         |
| 167 | ChilledDomineering("...x", ".x.", "x.x", "x.x")    | $v^*$  | -1         |
| 168 | ChilledDomineering("...x", ".x.", "x.x", "xx.")    | $\text{PowTo}(v,2)+^*$   | -1         |
| 169 | ChilledDomineering("...x", ".x.", "xx.", "x.x")    | $\{\wedge^* {\wedge^* v^*},\{\wedge^* v^*\}  vv\}$                                 | -0.5       |
| 170 | ChilledDomineering("...x", ".x.", "xx.x", "...x")  | $\{v v4\}$   | -2.5       |
| 171 | ChilledDomineering("...x", ".x.", "xx.x", "x...")  | $v^*$  | -1         |
| 172 | ChilledDomineering("...x", ".x.x", "...", "xx.x")  | 0  | 0          |
| 173 | ChilledDomineering("...x", ".x.x", "...", "xxx.")  | $\wedge$   | 1          |
| 174 | ChilledDomineering("...x", ".x.x", ".x.", "x.x")   | $+-\wedge^*$   | *          |
| 175 | ChilledDomineering("...x", ".x.x", ".x.", "xx.")   | $\{\wedge^* *,v,+(-*,\wedge) v,vv^*\}$   | 0.5        |
| 176 | ChilledDomineering("...x", ".x.x", ".x.x", "x...") | $\wedge^*$   | 2          |
| 177 | ChilledDomineering("...x", ".x.x", "x...", "xx")   | $v$  | -1         |
| 178 | ChilledDomineering("...x", ".x.x", "x...", "x.x")  | $\{\wedge^*,\wedge^3 {\wedge^*},\wedge^*,\{\wedge^*,\wedge^* 0,\wedge^*,\star\}\}$ | 2          |
| 179 | ChilledDomineering("...x", ".x.x", "x...", "x.x.") | $\wedge^4$   | 4          |
| 180 | ChilledDomineering("...x", ".x.x", "x...", "xx.")  | $\{\wedge^*,\wedge^3 {\wedge^*},\wedge^*,\{\wedge^*,\wedge^* 0,\wedge^*,\star\}\}$ | 2          |
| 181 | ChilledDomineering("...x", ".x.x", "x.x", "x...")  | $\{\wedge^3 {\wedge^*}\}$  | 1.5        |
| 182 | ChilledDomineering("...x", ".x.x", "xx.", "...x")  | 0  | 0          |
| 183 | ChilledDomineering("...x", "x...", "...x", "xxx")  | *  | 0          |
| 184 | ChilledDomineering("...x", "x...", "...x", "x.xx") | *  | 0          |
| 185 | ChilledDomineering("...x", "x...", "...x", "xx.x") | $\{\wedge^3 v\}$   | $1^*$      |
| 186 | ChilledDomineering("...x", "x...", ".x.", "xxx")   | $\{\wedge^3  \wedge^* vv^*\}$  | 1.25       |
| 187 | ChilledDomineering("...x", "x...", ".x.", "x.xx")  | *  | 0          |
| 188 | ChilledDomineering("...x", "x...", ".x.", "xxx.")  | $\{\wedge^* v\}$   | 0          |
| 189 | ChilledDomineering("...x", "x...", "xx", "xx")     | $\{\wedge^*, \uparrow +^* vv\}$  | -0.5       |
| 190 | ChilledDomineering("...x", "x...", "xx", "x.x")    | $v^*$  | -1         |
| 191 | ChilledDomineering("...x", "x...", "x...", "x.xx") | $\{0,\{\wedge^* 0,\wedge^*\} v\}$  | 0          |
| 192 | ChilledDomineering("...x", "x...", "x...", "xx.x") | $\{\wedge^3 {\wedge^3}  \wedge^* vv^*\}$   | 1.25       |

|     |   |                                |      |
|-----|---|--------------------------------|------|
| 193 | ChilledDomineering("...x","x...","x...","xxx.") | *                              | 0    |
| 194 | ChilledDomineering("...x","x...","x..x","..xx") | {^3 v}                         | 1*   |
| 195 | ChilledDomineering("...x","x...","x..x","x..x") | {^3 v}                         | 1*   |
| 196 | ChilledDomineering("...x","x...","x..x","xx..") | {0,^* v,v*}                    | 0    |
| 197 | ChilledDomineering("...x","x...","x..x","..xx") | ↑ <sup>+</sup>                 | 1    |
| 198 | ChilledDomineering("...x","x...","x..x","x..x") | ↑ <sup>+</sup>                 | 1    |
| 199 | ChilledDomineering("...x","x...","x..x","x..x") | {^3* ^}                        | 2    |
| 200 | ChilledDomineering("...x","x...","x.xx","...x") | {^3  ^* vv*}                   | 1.25 |
| 201 | ChilledDomineering("...x","x...","x.xx","x..")  | {^* v}                         | 0    |
| 202 | ChilledDomineering("...x","x...","xx..","x..x") | {*,{^ v*  v*} v,v*}            | -1   |
| 203 | ChilledDomineering("...x","x...","xx.x","...x") | {^ vv}                         | -0.5 |
| 204 | ChilledDomineering("...x","x...","xx.x","x..")  | *                              | 0    |
| 205 | ChilledDomineering("...x","x..x","....",".xxx") | {0 ^* ^ ^0,^*}                 | 1    |
| 206 | ChilledDomineering("...x","x..x","....","x.xx") | {^* ^ ^ ^PowTo(v,2)}           | 0.5  |
| 207 | ChilledDomineering("...x","x..x","....","xx.x") | {0,* v*,PowTo(v,2)}            | -1   |
| 208 | ChilledDomineering("...x","x..x","....","xxx.") | {*,^ 0,v*}                     | 0    |
| 209 | ChilledDomineering("...x","x..x","...","xx..")  | {^* v}                         | 0    |
| 210 | ChilledDomineering("...x","x..x","..xx","x..")  | {v,v* 0}                       | -2   |
| 211 | ChilledDomineering("...x","x..x","x...","..xx") | {^3 v,{0,v*,☆ v*,vv}}          | 1*   |
| 212 | ChilledDomineering("...x","x..x","x...","x..x") | {^3 {0,^* vv*},{0,v*,☆ v*,vv}} | 1*   |
| 213 | ChilledDomineering("...x","x..x","x...","x..x") | {^3* ^* ^}                     | 2    |
| 214 | ChilledDomineering("...x","x..x","x...","xx..") | ^^*                            | 1    |
| 215 | ChilledDomineering("...x","x..x","x..x","x..")  | ^^*                            | 2    |
| 216 | ChilledDomineering("...x","x..x","xx..","...x") | {^3 v}                         | 1*   |
| 217 | ChilledDomineering("...x","x.xx","....","..xx") | {0,* v,vv*},{0,v* vv,vv*}      | -1   |
| 218 | ChilledDomineering("...x","x.xx","....",".x.x") | {^ ^0,^*}                      | 1    |
| 219 | ChilledDomineering("...x","x.xx","....",".xx.") | ^^*                            | 1    |
| 220 | ChilledDomineering("...x","x.xx","....","x..x") | {^ 0,v*}                       | 0    |
| 221 | ChilledDomineering("...x","x.xx","....","x..x") | *                              | 0    |
| 222 | ChilledDomineering("...x","x.xx","....","xx..") | *                              | 0    |
| 223 | ChilledDomineering("...x","x.xx","...","x..")   | {^ ^0,*}                       | 1    |
| 224 | ChilledDomineering("...x","x.xx","x...",".x.")  | ^                              | 1    |
| 225 | ChilledDomineering("...x","xx..","....",".xxx") | +^-^                           | *    |
| 226 | ChilledDomineering("...x","xx..","....","x.xx") | +^-^                           | *    |
| 227 | ChilledDomineering("...x","xx..","....","xx.x") | {0,^* v3*}                     | -1*  |
| 228 | ChilledDomineering("...x","xx..","...x","..xx") | {^ vv}                         | -0.5 |
| 229 | ChilledDomineering("...x","xx..","...x",".x.x") | {^ v*}                         | 0    |

|     |   |  |      |
|-----|---|--|------|
| 230 | ChilledDomineering("...x","xx..","...x","x..x") | $\{\wedge^3 v^3*\}$  | -1   |
| 231 | ChilledDomineering("...x","xx..","...x","xx..") | vv   | -2   |
| 232 | ChilledDomineering("...x","xx..","x...","..xx") | $+-\wedge$   | *    |
| 233 | ChilledDomineering("...x","xx..","x...","x..x") | $+-\wedge$   | *    |
| 234 | ChilledDomineering("...x","xx..","xx..","...x") | $\{\wedge^3 v\}$   | 1*   |
| 235 | ChilledDomineering("...x","xx.x","....","..xx") | $\{\wedge vv\}$  | -0.5 |
| 236 | ChilledDomineering("...x","xx.x","....","x..x") | $\{\wedge v^*,vv\}$  | -0.5 |
| 237 | ChilledDomineering("...x","xx.x","....","xx..") | $+-\wedge$   | *    |
| 238 | ChilledDomineering("...x","xx.x","....","x..x") | $\{\wedge vv,v^3*\}$   | -1*  |
| 239 | ChilledDomineering("...x","xx.x","....","x..x") | $\{\wedge v^*,vv\}$  | *    |
| 240 | ChilledDomineering("...x","xx.x","....","xx..") | $\{0 v^4*\}$   | -2*  |
| 241 | ChilledDomineering("...x","xx.x","...x","x..")  | $\{0 vv^*\}$   | -1   |
| 242 | ChilledDomineering("...x","xx.x","x...","..x")  | $\{\wedge vv,vv^*\}$   | *    |
| 243 | ChilledDomineering("...x","....","x..x","x.xx") | $\{\wedge^* {\wedge v^*},{\wedge^* v^*},{\wedge^* v}\}$                            | 1    |
| 244 | ChilledDomineering("..x","....","x..x","xx.x")  | $\{0<2> v^*\}$   | 1    |
| 245 | ChilledDomineering("..x","....","x.xx","..xx")  | $+-(\wedge,\{\wedge^* 0,\wedge^*\})$   | 0    |
| 246 | ChilledDomineering("..x","....","x.xx","x..x")  | $+-(\wedge,\{\wedge^* 0,\wedge^*\})$   | 0    |
| 247 | ChilledDomineering("..x","....","xx.x","x..x")  | $\wedge^*$   | 1    |
| 248 | ChilledDomineering("..x","x...","...x",".xxx")  | $\{\wedge vv^*\}$  | *    |
| 249 | ChilledDomineering("..x","x...","...x","x.xx")  | $\{\wedge 0,*\}$   | 0    |
| 250 | ChilledDomineering("..x","x...","...x","xx.x")  | $\{\wedge^* v,vv^*\}$  | -0.5 |
| 251 | ChilledDomineering("..x","x...","..xx","..xx")  | $v^*$  | -1   |
| 252 | ChilledDomineering("..x","x...","..xx","x..x")  | $v^*$  | -1   |
| 253 | ChilledDomineering("..x","x...","x..x","..xx")  | $\{\wedge vv\}$  | -0.5 |
| 254 | ChilledDomineering("..x","x...","x..x","x..x")  | $\{\wedge,\{\wedge^* \wedge,\wedge^*\} vv\}$                                       | *    |
| 255 | ChilledDomineering("..xx","....","x...","x.xx") | $\{\wedge^*  0^*,\wedge  v^3*\}$   | 1    |
| 256 | ChilledDomineering("..xx","....","x...","xx.x") | 0  | 0    |
| 257 | ChilledDomineering("..xx","....","x..x","xx..") | $\{v^*,vv,\{0,v^*,\star v^*,vv\} vv,v^3*\}$  | -2   |
| 258 | ChilledDomineering("..xx","....","x..x","x..x") | $+-(\wedge,\{\wedge^* 0,\wedge^*\})$   | 0    |
| 259 | ChilledDomineering("..xx","....","xx..","x..x") | $\{\{\wedge^3 \wedge^*,\{\wedge^* vv^*\}\},\{\wedge^* v^*,\{\wedge^* v\}\} vv^*\}$ | -0.5 |
| 260 | ChilledDomineering("..xx","...x","x...","xx..") | 0  | 0    |
| 261 | ChilledDomineering("..xx","x...","....",".xxx") | $\{\wedge v,\{v,v^* vv^*\}\}$  | *    |
| 262 | ChilledDomineering("..xx","x...","....","x.xx") | $\{\wedge v^*,vv 0\}$  | -0.5 |
| 263 | ChilledDomineering("..xx","x...","....","xx.x") | $\{v^*,vv,\{0,v^*,\star v^*,vv\} vv,v^3*\}$  | -2   |
| 264 | ChilledDomineering("..xx","x...","...x","x..x") | $\{\wedge,\wedge^* v^*\}$  | 0.5  |
| 265 | ChilledDomineering("..xx","x...","...x","x..x") | $\{\wedge^* 0,\wedge^*  vv,v^3*\}$   | -1*  |
| 266 | ChilledDomineering("..xx","x...","...x","xx..") | v4   | -4   |

|     |  |   |      |
|-----|--|---|------|
| 267 | ChilledDomineering("..xx","x...","..x","x..x")   | $v^*$   | -1   |
| 268 | ChilledDomineering("..xx","x...","x...","..xx")  | $\{\wedge vv\}$   | -0.5 |
| 269 | ChilledDomineering("..xx","x...","x...","x..x")  | $\{\wedge vv\}$   | -0.5 |
| 270 | ChilledDomineering("..xx","x..x","....","x..x")  | $\{0,* v\}$   | 0    |
| 271 | ChilledDomineering("..xx","x..x","....","xx.")   | $\{\wedge v\}$  | 0.5  |
| 272 | ChilledDomineering("..xx","x..x","....","x..x")  | $\text{PowTo}(v,2)^{+*}$  | -1   |
| 273 | ChilledDomineering("..xx","x..x","....","x..x")  | *   | 0    |
| 274 | ChilledDomineering("..xx","x..x","....","x..x")  | $\wedge^*$  | 1    |
| 275 | ChilledDomineering("..xx","x..x","....","x..x")  | $\{\wedge 0,\{0,v^* vv^*\}\}$   | 0    |
| 276 | ChilledDomineering("x..x","....","...x","x..xx") | $+-(^*,\text{PowTo}(\wedge,3))$   | 0    |
| 277 | ChilledDomineering("x..x","....","...x","xx.x")  | $\{\wedge^*,\wedge v^*,vv v3^*\}$   | *    |
| 278 | ChilledDomineering("x..x","....","..x","x..xx")  | $\{\text{PowTo}(\wedge,2) 0,*\}$  | 1    |
| 279 | ChilledDomineering("x..x","....","x..x","x..x")  | $\{\wedge 0,\{0,v^* vv^*\}\}$   | 0    |
| 280 | ChilledDomineering("x..x","....","x..x","x..x")  | $\{\{\wedge^* v^*\},\{\wedge^* * v 0\} {\wedge^* v 0 0},\text{PowTo}(vv,2)\}$ | -1   |
| 281 | ChilledDomineering("x..x","...x","....","xx.x")  | $+-(0 \wedge^*,\wedge)$   | *    |
| 282 | ChilledDomineering("x..x","...x","x..","x..x")   | $\{\wedge^* vv\}$   | *    |
| 283 | ChilledDomineering("x..x","...x","x..","x..x")   | 0   | 0    |

4x4 大小的 11 格空格盤面

| Num | Position   | Value  | Atomic Weight |
|-----|--|--|---------------|
| 1   | ChilledDomineering("....","...","...x","xxxx")   | $\{\wedge^* vv,\{\wedge^* v3,v3^*\}\}$   | *             |
| 2   | ChilledDomineering("....","...","..x","xxxx")    | $\{\wedge^*,\wedge3 \wedge^*,\wedge^*,\{\wedge^*,\wedge^* \wedge^*,+-(^*,\wedge)\} v4^*\}$           | $\{0 -2\}$    |
| 3   | ChilledDomineering("....","...","..xx","xxx")    | $\{\wedge^* 0,v^*\}$   | 0.5           |
| 4   | ChilledDomineering("....","...","..xx","x..xx")  | $\{\wedge^*,\{\wedge3^* 0,\{0,* vv\}\} 0,v^*\}$  | 0.5           |
| 5   | ChilledDomineering("....","...","x..x","xxx")    | $\{\wedge 0,*\}$   | 1             |
| 6   | ChilledDomineering("....","...","x..x","xx.x")   | $\{\wedge^*,\wedge3^* \wedge^*,\wedge^*,\{\wedge^*,\wedge 0,\wedge^*,\star\} vv^*\}$                 | *             |
| 7   | ChilledDomineering("....","...","xx","xxx")      | $v$  | -1            |
| 8   | ChilledDomineering("....","...","xxx","..xx")    | $\{\{\wedge v^*\},\{\wedge^*,\{\wedge^* 0\} v\} {\wedge^* v3^*},\{0 v3\},\{v,\{0,* vv\} v3,v3^*\}\}$ | -1            |
| 9   | ChilledDomineering("....","...","x..x","x..xx")  | $\{\{\wedge3 0\},\{\wedge^*,\wedge3^* \wedge^*,\{\wedge^* 0,*\}\} 0,\{0,\{\wedge vv\} vv\}\}$        | 0.5           |
| 10  | ChilledDomineering("....","...","x..xx","..xx")  | $\{\wedge^*,\{\wedge^* 0 vv^*\} vv^*\}$  | -0.5          |
| 11  | ChilledDomineering("....","...","x..xx","x..x")  | $\{\wedge^*,\{\wedge^* 0 vv^*\} vv^*\}$  | -0.5          |
| 12  | ChilledDomineering("....","...x","....","xxxx")  | $v$  | -1            |
| 13  | ChilledDomineering("....","...x","...x","xxx")   | $+-(\uparrow^+,\wedge3 \wedge^*,\wedge^*)$   | *             |
| 14  | ChilledDomineering("....","...x","...x","x..xx") | $\{\wedge^*,\{\wedge^* \wedge^*,\star\} {\wedge^* vv},\{v^*,\star vv\}\}$                            | 0             |

|    |  |   |             |
|----|--|---|-------------|
| 15 | ChilledDomineering("....", "...x", "...x", "xx.x") | $\{*,\{^3lv^*\},\{\wedge,\wedge^*lv^*\},\{PowTo(\wedge,2)lPowTo(v,2)+*\}lv,vv^*\}$                            | -1          |
| 16 | ChilledDomineering("....", "...x", "..xx", "x..x") | $\{v,\{0,*lv\}lv3^*\}$  | -1.5        |
| 17 | ChilledDomineering("....", "...x", ".x.", ".xxx")  | $\wedge$  | 1           |
| 18 | ChilledDomineering("....", "...x", ".x.", "xx.x")  | $\{*,vll^*,vl0\}$   | -1          |
| 19 | ChilledDomineering("....", "...x", ".x.", "xxx.")  | $\{0l^*,\star llv^*,\star lvv\}$  | 0           |
| 20 | ChilledDomineering("....", "...x", ".x.x", ".xx")  | $\{\wedge^3l^*llv3^*\}$   | $\{0l-1\}$  |
| 21 | ChilledDomineering("....", "...x", ".x.x", ".x.x") | $\{\wedge^4*ll0,\wedge^*lv\}$   | $2^*$       |
| 22 | ChilledDomineering("....", "...x", ".x.x", "x..x") | $\{v,+(-,*,\wedge)lvv^*\}$  | -1          |
| 23 | ChilledDomineering("....", "...x", ".x.x", "xx..") | $\{v,+(-,*,\wedge)lvv^*\}$  | -1          |
| 24 | ChilledDomineering("....", "...x", ".xxx", "...x") | $\{Pow(\wedge,2)lv4^*\}$  | $-2^*$      |
| 25 | ChilledDomineering("....", "...x", "x...", "x.xx") | $\{\wedge^*llv^*lv3\}$  | *           |
| 26 | ChilledDomineering("....", "...x", "x...", "xx.x") | $\{0,\wedge^*lv^*,\{*,vllv\}\}$   | 0           |
| 27 | ChilledDomineering("....", "...x", "x...", "xxx.") | $\{0l^*,\wedge^*ll^*,\wedge^*lllv^*lv3\}$   | -0.5        |
| 28 | ChilledDomineering("....", "...x", "x..x", "..xx") | $\{0l^*,\wedge^*ll0,\wedge^*lll^*,vllv3\}$  | 0           |
| 29 | ChilledDomineering("....", "...x", "x..x", "x..x") | $\{\{\wedge^3*ll0,\{0,*lvv\}\},\{\wedge^3*ll^*\}l\{0lv3\},\{*,v,\{0,*lvv\}lv3\}\}$                            | 0           |
| 30 | ChilledDomineering("....", "...x", "x..x", "xx..") | $\{\{\wedge^3*ll^*\},\{\wedge^3*ll^*,v,+(-,*,\wedge)lv,vv^*\}lvv^*,\{*lv3\}\}$                                | -0.25       |
| 31 | ChilledDomineering("....", "...x", "x.xx", "...x") | $\{\wedge,\wedge^*lvv^*\}$  | -0.5        |
| 32 | ChilledDomineering("....", "...x", "x.xx", "x..")  | $\{\wedge lv4^*\}$  | $\{-1l-2\}$ |
| 33 | ChilledDomineering("....", "...x", "xx.", "x..x")  | $v$   | -1          |
| 34 | ChilledDomineering("....", "...x", "xx.", "xx..")  | $\{\wedge^3*ll0,\{0,*lvv\}lllvv^*\}$  | -1          |
| 35 | ChilledDomineering("....", "...x", "xx.x", "...x") | $\{\wedge^*lvv^*,\{v^*lv3\}\}$  | *           |
| 36 | ChilledDomineering("....", "...x", "xx.x", "x..")  | $\{\wedge^4*lvv^*\}$  | $\{2l0\}$   |
| 37 | ChilledDomineering("....", "..x.", "...", "xxxx")  | $\{\wedge^*ll0<2>\}$  | -2          |
| 38 | ChilledDomineering("....", "..x.", "...", "x.xx")  | $\{\wedge^*l\{\wedge^*lv\},+(-,*,\wedge)\}$   | 1           |
| 39 | ChilledDomineering("....", "..x.", "...", "xx.x")  | $\{\wedge^3*llv^*lv3\}$   | $\{1l0\}$   |
| 40 | ChilledDomineering("....", "..x.", "...", "x.xx")  | $\{\wedge^4*lv\}$   | $\{2l1\}$   |
| 41 | ChilledDomineering("....", "..x.", "...", "xxx.")  | $\{\wedge^*l\{\wedge^3l^*\}l\{\wedge lv3\},\{\wedge^*lv3\}\}$   | 1           |
| 42 | ChilledDomineering("....", "..x.", "...", "x..x")  | $\{\wedge^*,\{\wedge^*l\star,\{\wedge^*lv^*\}\},\{\wedge^3*ll^*\}l\{\wedge^*lv\},\{\wedge lvv,\{0lvv^*\}\}\}$ | 1           |
| 43 | ChilledDomineering("....", "..x.", ".x.", ".xxx")  | $\uparrow^+$  | 1           |
| 44 | ChilledDomineering("....", "..x.", ".x.", "xx.x")  | $\{\wedge^*l^*l^*,+(-,*,\wedge),\{\wedge,\wedge^*lv,\{\wedge^*lv^*\}\}\}$                                     | 1           |
| 45 | ChilledDomineering("....", "..x.", ".x.", "xxx.")  | $\{\wedge^*ll0,+(-,*,\wedge),\{0,\wedge^*lv^*,v\}\}$  | 1           |
| 46 | ChilledDomineering("....", "..x.", ".xx.", ".xx")  | $\{\wedge^3l^*ll^*,v\}$   | 0.5         |
| 47 | ChilledDomineering("....", "..x.", ".xx.", "xx.")  | $\{\wedge^4*ll^*\}$   | $2^*$       |
| 48 | ChilledDomineering("....", "..x.", ".xx.", "xx..") | $\wedge^*$  | 1           |
| 49 | ChilledDomineering("....", "..x.", "x...", "x.xx") | $\{\wedge^*lv3^*\}$   | $\{0l-1\}$  |
| 50 | ChilledDomineering("....", "..x.", "x...", "xx.x") | $\{\wedge^*l^*l^*,Pow(v,2)\}$   | 1           |
| 51 | ChilledDomineering("....", "..x.", "x...", "xxx.") | $\{\wedge^*llv^*lv3\}$  | *           |

|    |  |   |      |
|----|--|---|------|
| 52 | ChilledDomineering("....","..x","x..x","..xx")   | $\{\wedge^* vv^*\}$   | -0.5 |
| 53 | ChilledDomineering("....","..x","x..x","x..x")   | $\{\{\wedge^3 0\},\{\wedge^{\wedge^3} ^*\wedge^{\wedge^3 0,*}\} ^*\wedge^* v\}$   | 1    |
| 54 | ChilledDomineering("....","..x","x..x","xx..")   | $\{\wedge^*,\{\wedge^{\wedge^*} ^*\wedge^{\wedge^3 0,v^*}\} ^*\wedge^* vv\}$  | 0    |
| 55 | ChilledDomineering("....","..x","x..x","..xx")   | $\{\wedge^{\wedge^3} ^*\wedge^{\wedge^3 0},\text{Pow}(v,2)\}$   | 1.5  |
| 56 | ChilledDomineering("....","..x","x..x","x..x")   | $\{\wedge^{\wedge^3} ^*\wedge^{\wedge^3 0},\text{Pow}(v,2)\}$   | 1.5  |
| 57 | ChilledDomineering("....","..x","x..x","x..x")   | $\{\wedge^4 ^*\}$   | 2*   |
| 58 | ChilledDomineering("....","..x","x..x","xx..")   | $\uparrow^+*$   | 1    |
| 59 | ChilledDomineering("....","..x","x..xx","x..x")  | $\{0,\wedge^* v^*\}$  | 1    |
| 60 | ChilledDomineering("....","..x","x..xx","x..x")  | $\{0 0,\wedge^* v^*\wedge^* v^3\}$  | -0.5 |
| 61 | ChilledDomineering("....","..x","xx..","x..x")   | $\{\{\wedge^3 v^*\},\{\wedge^3 v\} v,\{0 v^3\}\}$   | -1   |
| 62 | ChilledDomineering("....","..x","xx..","xx..")   | $+-(\{\wedge^{\wedge^*} ^*\wedge^{\wedge^*} ^*\wedge^{\wedge^*} v^*\},\{\wedge^3 0\})$                                  | 0    |
| 63 | ChilledDomineering("....","..x","xxx","x..x")    | $\wedge^*$  | 1    |
| 64 | ChilledDomineering("....","..xx","....","x..xx") | $\{\text{PowTo}(v,2)+^* 0\}$  | -2   |
| 65 | ChilledDomineering("....","..xx","....","xx..x") | $\{^*\wedge^{\wedge^3 0},\text{Pow}(v,2) v^3\}$   | -1.5 |
| 66 | ChilledDomineering("....","..xx","....","xxx..") | $\{\text{Pow}(v,2) v^*\}$   | -1   |
| 67 | ChilledDomineering("....","..xx","x..x","x..x")  | $\{\text{Pow}(v,2),\{\wedge^{\wedge^3 0},\wedge^{\wedge^3 0}\} v^4\}$   | -2*  |
| 68 | ChilledDomineering("....","..xx","x..x","xx..")  | $\{^*\wedge^{\wedge^3 0},\text{Pow}(v,2) v^4\}$   | -2*  |
| 69 | ChilledDomineering("....","..xx","xx..","x..x")  | $\{\wedge^* ^*\wedge^{\wedge^3 0},\wedge^{\wedge^3 0} v^*\}$  | -0.5 |
| 70 | ChilledDomineering("....","..xx","x..x","..xx")  | $\{vv,vv^* v^4\}$   | -3   |
| 71 | ChilledDomineering("....","..xx","x..x","x..x")  | $\{\wedge^* vv\}$   | *    |
| 72 | ChilledDomineering("....","..xx","x..x","x..x")  | $\wedge^*$  | 1    |
| 73 | ChilledDomineering("....","..xx","x..x","xx..")  | $\{\wedge^{\wedge^*} ^*\wedge^{\wedge^3 0},\{0,\{\wedge^{\wedge^3 0},\wedge^{\wedge^3 0}\} 0\} ^*\wedge^{\wedge^3 0}\}$ | -1   |
| 74 | ChilledDomineering("....","..xx","x..x","x..x")  | $v^*$   | -1   |
| 75 | ChilledDomineering("....","..xx","x..x","x..x")  | $\{\wedge^* 0,\{\wedge^{\wedge^3 0}\} v^*\}$  | 0.5  |
| 76 | ChilledDomineering("....","..xx","x..x","x..x")  | $\{\wedge^{\wedge^3 0}\}$   | 0.5  |
| 77 | ChilledDomineering("....","..xx","x..xx","....") | $\{0 vv^*\}$  | -1   |
| 78 | ChilledDomineering("....","x..x","....","xxx..") | *   | 0    |
| 79 | ChilledDomineering("....","x..x","....","x..xx") | $\{^*\wedge^{\wedge^3 0},\text{Pow}(v,2) v^*\}$   | -1   |
| 80 | ChilledDomineering("....","x..x","....","xx..x") | vv  | -2   |
| 81 | ChilledDomineering("....","x..x","....","xxx..") | v   | -1   |
| 82 | ChilledDomineering("....","x..x","x..x","x..x")  | $\{\wedge^3 0,\{\wedge^{\wedge^3 0}\} v^*\}$  | -0.5 |
| 83 | ChilledDomineering("....","x..x","x..x","xx..")  | v <sup>3</sup>  | -3   |
| 84 | ChilledDomineering("....","x..x","xx..","x..x")  | vv  | -2   |
| 85 | ChilledDomineering("....","x..x","x..x","..xx")  | $\{0,v^* 0,*\}$   | -1   |
| 86 | ChilledDomineering("....","x..x","x..x","x..x")  | $\{0,\wedge^* ^*,v\}$   | 0    |
| 87 | ChilledDomineering("....","x..x","x..x","xx..")  | $\{\wedge^{\wedge^3 0},*\}$   | 1    |
| 88 | ChilledDomineering("....","x..x","x..x","x..x")  | $+-(\wedge^*)$  | *    |

|     |   |   |       |
|-----|---|---|-------|
| 89  | ChilledDomineering("....",".x.x",".x..","xx..")   | $\{\wedge^*\ 0,v^*,\star v^*,vv\}$  | 0.5   |
| 90  | ChilledDomineering("....",".x.x",".x.x","...x")   | $\{0 \wedge^*,\wedge^*\}$   | 3     |
| 91  | ChilledDomineering("....",".x.x",".x.x",".x..")   | $\{\wedge^4* v\}$   | {2 1} |
| 92  | ChilledDomineering("....",".x.x",".x.x","x..")    | $\wedge\wedge$  | 2     |
| 93  | ChilledDomineering("....",".x.x",".xxx","....")   | $\{\wedge^10,\{\wedge^1vv\}\}$  | 0     |
| 94  | ChilledDomineering("....",".x.x","x..",".xx")     | $\{\wedge^* v\ 0\}$   | -1    |
| 95  | ChilledDomineering("....",".x.x","x..","x..x")    | $\star$   | 0     |
| 96  | ChilledDomineering("....",".x.x","x..","x..x")    | $\wedge\wedge$  | 2     |
| 97  | ChilledDomineering("....",".x.x","x..","xx..")    | $\star$   | 0     |
| 98  | ChilledDomineering("....",".x.x","x..x","...x")   | $*$   | 0     |
| 99  | ChilledDomineering("....",".x.x","x..x","x..")    | $\{0,\wedge^*\ *,v vv\}$  | 0     |
| 100 | ChilledDomineering("....",".x.x","xx..","...x")   | $\{\wedge^10,v^*\}$   | 0     |
| 101 | ChilledDomineering("....",".x.x","xx..","x..")    | $\{0,\wedge^*\ *,v vv\}$  | 0     |
| 102 | ChilledDomineering("....",".x.x","xx.x","....")   | $\{0,v^* vv^*\}$  | -1    |
| 103 | ChilledDomineering("....",".xx","....","x.xx")    | $\{\wedge^* 0<2>\}$   | -1    |
| 104 | ChilledDomineering("....",".xx","...x","x..x")    | $v^*$   | -1    |
| 105 | ChilledDomineering("....",".xx","...x","xx..")    | $\{\{\wedge^* v\},\{\wedge^* vv^*\} vv^*\}$                                       | -1    |
| 106 | ChilledDomineering("....",".xx","..x","x..x")     | $v^*$   | -1    |
| 107 | ChilledDomineering("....",".xx","..x","x..x")     | $\wedge^*$  | 1     |
| 108 | ChilledDomineering("....",".xx","..x","xx..")     | $v^*$   | -1    |
| 109 | ChilledDomineering("....",".xx",".xx","x..")      | $v^3^*$   | -3    |
| 110 | ChilledDomineering("....",".xx",".xx","...x")     | $*$   | 0     |
| 111 | ChilledDomineering("....",".xx",".xx","..x")      | $\{\wedge^* v\}$  | 0.5   |
| 112 | ChilledDomineering("....",".xxx","....","x..x")   | $\{+-(*,\wedge),\text{Pow}(v,2),\{\wedge^*,\wedge^* v,\{\wedge^10,v^*\}\} 0\}$    | -1    |
| 113 | ChilledDomineering("....",".xxx","....","x..x")   | $\{\wedge^*,\wedge^* *,\{\wedge^* v\}\}$  | 1     |
| 114 | ChilledDomineering("....",".xxx","....","xx..")   | $\{*,v vv^*\}$  | -1    |
| 115 | ChilledDomineering("....",".xxx","...x","x..")    | $\{\wedge^*,+-(*,\wedge),\{\wedge^*,\wedge^* v,\{\wedge^10,v^*\}\} 0,\{0 v^3\}\}$ | 0     |
| 116 | ChilledDomineering("....",".xxx","..x","x..")     | $\{\wedge^*\ v^* v^3\}$   | *     |
| 117 | ChilledDomineering("....",".x..x","....",".xxx")  | $v$   | -1    |
| 118 | ChilledDomineering("....",".x..x","....","x..xx") | $vv$  | -2    |
| 119 | ChilledDomineering("....",".x..x","...x",".xx")   | $\{\{\wedge^3 0\},\{\wedge^3 \wedge^*,\{\wedge^1vv\}\} *,\text{PowTo}(v,2)\}$     | 0     |
| 120 | ChilledDomineering("....",".x..x","...x",".x..x") | $\{\wedge^*\ 0,*\}$   | 1     |
| 121 | ChilledDomineering("....",".x..x","...x","x..x")  | $\{+-(*,\wedge),\{\wedge^1v^*\} *\text{PowTo}((vv^*),2)\}$                        | -1    |
| 122 | ChilledDomineering("....",".x..x","...x","xx..")  | $v^3$   | -3    |
| 123 | ChilledDomineering("....",".x..x",".xx","...x")   | $\{+-(*,\wedge) 0\}$  | -1    |
| 124 | ChilledDomineering("....",".x..x",".xx","x..")    | $vv$  | -2    |
| 125 | ChilledDomineering("....",".x..x",".x..x","...x") | $\{\wedge^*\ v\}$   | 0.5   |

|     |   |   |              |
|-----|---|---|--------------|
| 126 | ChilledDomineering("....","x..x","x..x","...x") | $\{0,v^{*0},*\}$  | -1           |
| 127 | ChilledDomineering("....","x..x","x.xx","....") | $v^3$   | -3           |
| 128 | ChilledDomineering("....","x.xx","....","..xx") | $\{v^*,vv v^4\}$  | -2.5         |
| 129 | ChilledDomineering("....","x.xx","....","x.x")  | $\{\wedge^* v,vv^*\}$   | -0.5         |
| 130 | ChilledDomineering("....","x.xx","....",".xx.") | $\{\wedge^* vv^*\}$   | -0.5         |
| 131 | ChilledDomineering("....","x.xx","....","x..x") | $\{^* v^3\}$  | -1.5         |
| 132 | ChilledDomineering("....","x.xx","....","x.x.") | $\text{PowTo}(v,2)$   | -1           |
| 133 | ChilledDomineering("....","x.xx","....","xx..") | $v$   | -1           |
| 134 | ChilledDomineering("....","x.xx","...x","...x") | $\{\wedge^* v^4\}$  | $\{0 -2\}$   |
| 135 | ChilledDomineering("....","x.xx","...x","x..")  | $\{\wedge^* vv,vv^*\}$  | -0.5         |
| 136 | ChilledDomineering("....","x.xx","...x","x..")  | $v$   | -1           |
| 137 | ChilledDomineering("....","x.xx","..x","x..")   | $v^3$   | -3           |
| 138 | ChilledDomineering("....","x.xx","x..","...x")  | $vv$  | -2           |
| 139 | ChilledDomineering("....","x.xx","x..","x..")   | $\text{PowTo}(vv,2)$  | -2           |
| 140 | ChilledDomineering("....","x.xx","x..","x..")   | $\{0,\wedge^* v v^4\}$  | -2*          |
| 141 | ChilledDomineering("...x","....","...x","x.xx") | $+-(^*,\wedge^* \star)$   | 0            |
| 142 | ChilledDomineering("...x","....","...x","xx.x") | $\{\wedge^*,\{\wedge^3 \wedge^*\}\{\wedge^* v\},\text{PowTo}(v,2)+^*,\{\star,\star vv\}\}$  | 0.5          |
| 143 | ChilledDomineering("...x","....","..x","x.xx")  | $\{\wedge^*,\{\wedge^3 \wedge^*,\{0,\wedge^* v\}\}\{0,\wedge^0,*\}\}$   | 1            |
| 144 | ChilledDomineering("...x","....","..x","xxx.")  | $\{\wedge^4*  ^* v^3\}$   | $\{2 0.5\}$  |
| 145 | ChilledDomineering("...x","....","..x","xx.x")  | $\{\wedge^*,\{\wedge^3*  0,* v\}  ^*,\star vv\}$  | 0            |
| 146 | ChilledDomineering("...x","....","..x","xxx.")  | $*$   | 0            |
| 147 | ChilledDomineering("...x","....","x.x","x..x")  | $\{0,+-(^*,\wedge^*) 0,v^*\}$   | -1           |
| 148 | ChilledDomineering("...x","....","x.x","xx..")  | $\{0,+-(^*,\wedge^*) 0,v^*\}$   | -1           |
| 149 | ChilledDomineering("...x","....","xx","xx..")   | $\{\wedge^*,\{\wedge^*,\wedge^3 \wedge^*,\wedge^*,\{\wedge^*,\wedge^* \wedge^*,\wedge^*,+-(^*,\wedge^*)\}\}\{\wedge^0 vv\},\{\{\wedge^0,v^*\},\{\wedge^0 vv\} vv,v^3\}\}$ | 0.25         |
| 150 | ChilledDomineering("...x","....","x..","x.xx")  | $\{\wedge^4*  v,\{v,vv^* 0\} 0\}$   | $\{2 0\}$    |
| 151 | ChilledDomineering("...x","....","x..","xx.x")  | $\{\text{PowTo}((\wedge^*),2) v^*\}$  | 0.5          |
| 152 | ChilledDomineering("...x","....","x..","xxx.")  | $\{\text{Pow}(\wedge^*,2),\{\wedge^3 v\} v^4\}$   | $\{-1* -2\}$ |
| 153 | ChilledDomineering("...x","....","x..x","..xx") | $\{\wedge^* vv^*\}$   | -0.5         |
| 154 | ChilledDomineering("...x","....","x..x","x..x") | $\{\wedge^3 0 vv^*\}$   | -0.25        |
| 155 | ChilledDomineering("...x","....","x..x","xx..") | $\{\wedge^* vv^*\}$   | -0.5         |
| 156 | ChilledDomineering("...x","....","x..x","..xx") | $\{\wedge^*,\{\wedge^* 0<2> vv^*\}$   | -0.5         |
| 157 | ChilledDomineering("...x","....","x..x","x..x") | $\{\wedge^*,\{\wedge^* 0<2> vv^*\}$   | -0.5         |
| 158 | ChilledDomineering("...x","....","x..x","x..x") | $\{\wedge^4 vv^*\}$   | $\{2 0\}$    |
| 159 | ChilledDomineering("...x","....","x..x","xx..") | $\{\wedge^*,\{\wedge^*,\wedge^3 \wedge^*,\wedge^*,\{\wedge^*,\wedge^* \wedge^*,\wedge^*,+-(^*,\wedge^*)\}\} v^*\}$  | 0.5          |
| 160 | ChilledDomineering("...x","....","x.xx","...x") | $\{0,\wedge^* vv^*\}$   | -0.5         |
| 161 | ChilledDomineering("...x","....","x.xx","x..")  | $\{0,v^* v^4\}$   | -2*          |
| 162 | ChilledDomineering("...x","....","xx..","x..x") | $\{0,\{\wedge^* 0\} 0 v,vv^*,\{\star,v,+-(^*,\wedge^*) v,vv^*\} vv^*,v^3\}$   | -0.5         |



|     |  |   |         |
|-----|--|---|---------|
| 163 | ChilledDomineering("...x", "...", "xx.", "xx.")    | $+-\{\wedge^*, \wedge^3  \wedge^*, \{\wedge, \wedge^*  \wedge, +-(*, \wedge)\}\}$   | *       |
| 164 | ChilledDomineering("...x", "...", "xx.x", "...x")  | $\{\wedge^*, \wedge^4  \wedge^*, \star \  v^4\}$  | {-1 -2} |
| 165 | ChilledDomineering("...x", "...", "xx.x", "x...")  | $\{\wedge^*, \{\wedge^*, \wedge^4  \wedge^*, \star\} \  v^*\}$  | -0.5    |
| 166 | ChilledDomineering("...x", "...", "xxx.", "x...")  | $\{\{\wedge^3  v^*\}, \{\wedge^3  v\} \  \{v, v^*, \{*, v, +-(*, \wedge)   v, v^*\} \  v^*, v^3\}, \{v^*   v^3\}\}$                                       | -1      |
| 167 | ChilledDomineering("...x", "...x", "...", "xx.x")  | $+-(\{\wedge^*   v^*\}, \{\wedge^3  0\}, \{\wedge^4  \wedge^*, \star\})$  | 0       |
| 168 | ChilledDomineering("...x", "...x", "...", "xxx.")  | $\{\wedge^*   v^*\}$  | *       |
| 169 | ChilledDomineering("...x", "...x", ".x.", "x..x")  | v   | -1      |
| 170 | ChilledDomineering("...x", "...x", ".x.", "xx.")   | $\{\wedge^3*   0, *   v \  \  v^*\}$  | -0.25   |
| 171 | ChilledDomineering("...x", "...x", ".x.x", "x...") | *   | 0       |
| 172 | ChilledDomineering("...x", "...x", "x...", ".xx")  | $\{\wedge^3  \wedge^*, \{\wedge^*   0, \wedge^*\} \  v^4\}$   | {0 -2}  |
| 173 | ChilledDomineering("...x", "...x", "x...", "x..x") | $\{\wedge^*, \{\wedge^3, \wedge^3  \wedge^*, \wedge, \{\wedge^*, \wedge^4  \wedge^*\}\} \  v, v^*, \{*, v, +-(*, \wedge)   v, v^*\} \  v^*, v^3\}$        | *       |
| 174 | ChilledDomineering("...x", "...x", "x...", "x..x") | $\{\wedge^4*, \wedge^4  \wedge^*\}$   | 2*      |
| 175 | ChilledDomineering("...x", "...x", "x...", "xx.")  | $\{\{\wedge^3  0\}, \{\wedge^3, \wedge^3  \wedge^*, \wedge, \{\wedge^*, \wedge^4  \wedge^*\}\} \  v, v^*, \{*, v, +-(*, \wedge)   v, v^*\} \  v^*, v^3\}$ | *       |
| 176 | ChilledDomineering("...x", "...x", "x..x", "x...") | $\{\wedge^4*   v, v^*, \{*, v, +-(*, \wedge)   v, v^*\} \  v^*, v^3\}$  | {2 0}   |
| 177 | ChilledDomineering("...x", "...x", "xx.", "...x")  | $+-(\wedge^4)$  | -2      |
| 178 | ChilledDomineering("...x", "...x", "xx.", "x...")  | $\{\wedge^4*   v, v^*, \{*, v, +-(*, \wedge)   v, v^*\} \  v^*, v^3\}$  | {2 0}   |
| 179 | ChilledDomineering("...x", "...x", "x...", "...x") | $\{0, \wedge^*   v^*\}$   | -0.5    |
| 180 | ChilledDomineering("...x", "...x", "x...", "...x") | $\{*, v   v^*\}$  | -1      |
| 181 | ChilledDomineering("...x", ".x.", "...", "x.xx")   | $\{\uparrow^+, \{\wedge^3  v\} \  v^*   v^3\}$  | -0.5    |
| 182 | ChilledDomineering("...x", ".x.", "...", "xx.x")   | $\{\wedge^4   v^*\}$  | *       |
| 183 | ChilledDomineering("...x", ".x.", "...", "xxx.")   | $\{0, *   v^*, v^*\}$   | -1      |
| 184 | ChilledDomineering("...x", ".x.", "...x", "xx.")   | v <sup>3</sup>  | -3      |
| 185 | ChilledDomineering("...x", ".x.", ".x.", "x..x")   | $+-(\wedge^3   v)$  | 0       |
| 186 | ChilledDomineering("...x", ".x.", ".x.", "x..x")   | $\{\wedge^4   \wedge^4   v\}$   | 2       |
| 187 | ChilledDomineering("...x", ".x.", ".x.", "xx.")    | $\{*, v   0\}$  | -1      |
| 188 | ChilledDomineering("...x", ".x.", ".x.", "x..x")   | $\{\wedge, \{\wedge^*, \wedge^3  \wedge^*, \wedge, \{\wedge^*, \wedge^*   \wedge, +-(*, \wedge)\}\} \  \wedge^3\}, \{\wedge^*   v^3\}\}$                  | 1       |
| 189 | ChilledDomineering("...x", ".x.", ".x.x", "x...")  | $\{\wedge^*   v\}$  | 0.5     |
| 190 | ChilledDomineering("...x", ".x.", ".xx.", "x...")  | $+-\wedge^4$  | *       |
| 191 | ChilledDomineering("...x", ".x.", "x...", ".xx")   | $\{v, v^*   v^4\}$  | -2.5    |
| 192 | ChilledDomineering("...x", ".x.", "x...", "x..x")  | $\{\wedge^3  0 \  v, \{v, v^*, \{*, v, +-(*, \wedge)   v, v^*\} \  v^*, v^3\}\}$  | -0.25   |
| 193 | ChilledDomineering("...x", ".x.", "x...", "x..x")  | $\wedge$  | 1       |
| 194 | ChilledDomineering("...x", ".x.", "x..x", "...x")  | $\{*, v, +-(*, \wedge)   v, v^*\}$  | -1      |
| 195 | ChilledDomineering("...x", ".x.", "x..x", "x...")  | v   | -1      |
| 196 | ChilledDomineering("...x", ".x.", "xx.", "...x")   | $\{0   0, *   v \  \  v^4\}$  | {-1 -2} |
| 197 | ChilledDomineering("...x", ".x.x", "...", "xx.")   | $+-\wedge^4$  | *       |
| 198 | ChilledDomineering("...x", ".x.x", "x...", "...x") | $\wedge^4$  | 2       |
| 199 | ChilledDomineering("...x", ".x.x", "x...", ".x.")  | $\{0   \wedge^*, \wedge^4\}$  | 2       |

|     |  |   |         |
|-----|--|---|---------|
| 200 | ChilledDomineering("...x","x...","....",".xxx")  | $\{\wedge, \wedge^* 0, \{\wedge 0, *\}\}$   | 1       |
| 201 | ChilledDomineering("...x","x...","....","x.xx")  | ☆   | 0       |
| 202 | ChilledDomineering("...x","x...","....","xx.x")  | $\{0, \wedge^* vv^*\}$  | -0.5    |
| 203 | ChilledDomineering("...x","x...","....","xxx.")  | $\{0 vv^*\}$  | -1      |
| 204 | ChilledDomineering("...x","x...","...x",".xx")   | ☆   | 0       |
| 205 | ChilledDomineering("...x","x...","...x",".x.x")  | $\{\wedge^4 \wedge^*\}$   | 2.5     |
| 206 | ChilledDomineering("...x","x...","...x","x..x")  | $\{\wedge^* 0, v^*\}$   | 0.5     |
| 207 | ChilledDomineering("...x","x...","...x","xx.")   | vv  | -2      |
| 208 | ChilledDomineering("...x","x...","..x",".xx")    | $\{\wedge^3 \wedge^*, \{0, \wedge^* v\}  \{0 v3\}, \{v, \{\wedge^* v\} v3\}\}$            | 0       |
| 209 | ChilledDomineering("...x","x...","..x",".xx.")   | $\{\wedge^* 0\}$  | 1       |
| 210 | ChilledDomineering("...x","x...","..x","x..x")   | v   | -1      |
| 211 | ChilledDomineering("...x","x...","..x","x..x.")  | $\{\wedge^* 0, \wedge^*\}$  | 1       |
| 212 | ChilledDomineering("...x","x...",".xx","x..")    | vv  | -2      |
| 213 | ChilledDomineering("...x","x...","x...",".xx")   | $\{\wedge^4 vv^*\}$   | {2 0}   |
| 214 | ChilledDomineering("...x","x...","x...","x..x")  | $\{\wedge^4 \{0 v3\}, \{\wedge^*, \star, \{0, \wedge^* v\} v\}\}$                         | {2 0.5} |
| 215 | ChilledDomineering("...x","x...","x..x",".x..x") | $\{\wedge^3 \wedge, \wedge^*\}$   | 2       |
| 216 | ChilledDomineering("...x","x...","x..x","x..")   | $\{0, * 0, \wedge^*\}$  | 1       |
| 217 | ChilledDomineering("...x","x...","x..x",".x..x") | ^3  | 3       |
| 218 | ChilledDomineering("...x","x...","x..x",".x..")  | $\{\wedge^* 0\}$  | 1       |
| 219 | ChilledDomineering("...x","x...","xx..",".x..x") | $\{\wedge, \wedge^* vv^*\}$   | *       |
| 220 | ChilledDomineering("...x","x..x","....",".xx")   | $\{0, \{\wedge^3 0\} *, \text{PowTo}(v, 2)\}$   | 0       |
| 221 | ChilledDomineering("...x","x..x","....",".x..x") | $\{0 \wedge, \wedge^*  *, \wedge\}$   | 1       |
| 222 | ChilledDomineering("...x","x..x","....",".xx.")  | $\{\wedge, \wedge^* \wedge, \{\wedge 0, *\}\}$  | 1       |
| 223 | ChilledDomineering("...x","x..x","....","x..x")  | $\{\{\wedge^* v\}, \{\wedge^* 0, v^* 0, *\}  \text{PowTo}(v, 2), \text{PowTo}(vv^*, 2)\}$ | -1      |
| 224 | ChilledDomineering("...x","x..x","....","x..x.") | $\{0 \wedge, \wedge^*  *, \wedge\}$   | 1       |
| 225 | ChilledDomineering("...x","x..x","....","xx.")   | v*  | -1      |
| 226 | ChilledDomineering("...x","x..x","...x",".x..")  | $\{\wedge^*  \star, \{0, \wedge^* v\} vv\}$   | 0.5     |
| 227 | ChilledDomineering("...x","x..x","x...",".x..")  | $\{\wedge^4 0, \star, \{*, \wedge^* vv\}\}$   | {2 1.5} |
| 228 | ChilledDomineering("...x","x.xx","....",".x..")  | $\{\wedge, \wedge^*, \{\wedge^* \wedge, \wedge\} 0, v^*\}$                                | 0       |
| 229 | ChilledDomineering("...x","x.xx","....",".x..")  | ^   | 1       |
| 230 | ChilledDomineering("...x","xx..","....",".xx")   | +-(^*)  | *       |
| 231 | ChilledDomineering("...x","xx..","....",".x..x") | $\{\wedge, \wedge^* vv^*\}$   | *       |
| 232 | ChilledDomineering("...x","xx..","....","x..x")  | $\{\wedge, \wedge^* vv^*\}$   | *       |
| 233 | ChilledDomineering("...x","xx..","...x",".x..")  | $\{*\} vv\}$  | -1      |
| 234 | ChilledDomineering("...x","xx.x","....",".x..")  | +-(^*)  | *       |
| 235 | ChilledDomineering("...x","xx.x","....",".x..")  | $\{\wedge, \{\wedge, \wedge^* \wedge, v\} v3^*\}$   | -1*     |
| 236 | ChilledDomineering("..x","....","x..x",".xx")    | +-(^*)  | *       |

|     |   |  |      |
|-----|---|--|------|
| 237 | ChilledDomineering("..x.", "....", "x..x", "x..x")  | $\{\wedge, \wedge^*   \{0 \wedge, \wedge^*   0   v v^*\}, \{\wedge   v v, \{0   v v^*\}\}\}$ | 1    |
| 238 | ChilledDomineering("..x.", "x...", "x..." ..xx")    | $\{\{\wedge, \{\wedge^*   0\}   v\}, \{\wedge^*   0 < 2 >\}, \{\wedge   0, \wedge^*\}   v\}$ | 0    |
| 239 | ChilledDomineering("..x.", "x...", "x..." ..x.x")   | $\{\wedge^*   \}$  | 1    |
| 240 | ChilledDomineering("..x.", "x...", "x..." ..x.x")   | $\{\wedge^*   \wedge, \wedge^*   v v^*\}$  | *    |
| 241 | ChilledDomineering("..xx", "....", "x..." ..x..x")  | 0  | 0    |
| 242 | ChilledDomineering("..xx", "x..." ..x..." ..x.x")   | $\{\wedge^*   v, v^*   v v^*\}$  | *    |
| 243 | ChilledDomineering("..xx", "x..." ..x..." ..x..x")  | $\{*, \{*, v   0\}   v v^*\}$  | -1   |
| 244 | ChilledDomineering("x..x", "....", "....", "x..xx") | $\{\{\wedge^*   \wedge, \{0, \{\wedge^*   0\}   0\}   v, v^*   v^3\}\}$                      | -0.5 |
| 245 | ChilledDomineering("x..x", "....", "x..", "x..x")   | 0  | 0    |

4x4 大小的 12 格空格盘面

| Num | Position   | Value   | Atomic Weight |
|-----|--|---|---------------|
| 1   | ChilledDomineering("....", "....", "....", "xxxx")       | $\{\wedge^4   \text{PowTo}(v, 2)   v^3^*\}$   | -1+Miny(1)    |
| 2   | ChilledDomineering("....", "....", "x...", "xxx")        | $\{\{\wedge^*   \wedge   0, v^*\}, \{\wedge^*   0, \wedge^*   0\}, \{\text{PowTo}((\wedge^3^*), 2)   v v^*\}   v v^*\}$   | -0.5          |
| 3   | ChilledDomineering("....", "....", "x..." ..x..xx")      | $\{\{\wedge^3^*   v\}, \{\wedge^3^*   \wedge^*\}, \{\wedge^*   v\}, \{\wedge^*   \wedge   0, v^*\}, \{\wedge^*   \text{Pow}(v, 2)   v^3\}, \{\wedge^*   \text{PowTo}(v v, 2)\}, \{v^*, \{\wedge   0, v^*\}   0\}\}$ | 0             |
| 4   | ChilledDomineering("....", "....", "x..." ..xx..x")      | $\{\wedge^3, \wedge^4^*   \wedge^*, \{\wedge^*   \wedge^*\}   \{\wedge^*, \wedge   0, \wedge^*, \wedge^*\}   v^3\}, \{v, v v^*   \text{PowTo}((v^3^*), 2)\}\}$  | {0.5 0}       |
| 5   | ChilledDomineering("....", "....", "x.." ..xxx")         | $\{\wedge^*, \wedge^3^*   \wedge^*, \wedge^*, \{\wedge^*, \wedge   0, \wedge^*, \wedge^*\}   v^3^*\}$   | {0 -1}        |
| 6   | ChilledDomineering("....", "....", "x.." ..x..xx")       | $\{\{\wedge^*, \wedge^3^*   \wedge^*, \wedge^*, \{\wedge^*, \wedge   0, \wedge^*, \wedge^*\}   v^3^*\}, \{\wedge^3   0, \{0, *   v v^*\}\}   v^3^*\}$   | {0 -1}        |
| 7   | ChilledDomineering("....", "....", "x.." ..xxx.)         | $\{\wedge^3, \{\wedge^3   \wedge, \wedge^*\}   v, \{\wedge^*   v^*   v^3\}\}$   | {1 0.75}      |
| 8   | ChilledDomineering("....", "....", "x.." ..xx")          | *   | 0             |
| 9   | ChilledDomineering("....", "....", "x.." ..xx", "x..x")  | $\{\uparrow^+   \{\uparrow^+   0\}, \{v^*, \{\wedge   0, v^*\}   0\}\}$   | -0.5          |
| 10  | ChilledDomineering("....", "....", "x..x", "x..xx")      | $\{0, \{0, \{\wedge^*, \wedge   0, \wedge^*, \wedge^*\}   v^*, v, +(-, \wedge)   v, v v^*\}   \{v^*, \{0, *   v v^*\}   v^3^*, v^3\}, \{v^*, v, \{0, v^*, \wedge^*   v^*, v v\}   v v, v^3^*\}\}$                   | -1            |
| 11  | ChilledDomineering("....", "....", "x..x", "x..x")       | $\{\wedge^3^*   \wedge^*\}$   | 2             |
| 12  | ChilledDomineering("....", "....", "x..x", "x..x")       | $\{\wedge, \wedge^*   \wedge, +(-, \wedge)   v^3^*, \{v^*, v v   v^3^*\}\}$   | -1*           |
| 13  | ChilledDomineering("....", "....", "x..x", "xx..")       | $\{\wedge, \wedge^*   \wedge, +(-, \wedge)   v^3^*, \{v^*, v v   v^3^*\}\}$   | -1*           |
| 14  | ChilledDomineering("....", "....", "x.." ..xx", "x..xx") | $\{0, \{\wedge^*, \wedge   0, \wedge^*, \wedge^*\}   v^*, v, +(-, \wedge)   v, v v^*   v^3^*, \{v^*   v^3^*\}\}$  | -1.5          |
| 15  | ChilledDomineering("....", "....", "x.." ..xx", "x..xx") | $\{0   \wedge, \{0, *   0, \{0, *   v v\}\}\}$  | 1             |

|    |   |   |                |
|----|---|---|----------------|
| 16 | ChilledDomineering("....","....",".xxx","...x") | $\{\{\wedge\}v^*,\{\wedge\}v\}v^*,v^3,\{v^*,\{*,v\}v^*\}v^3,v^4\}$  | -1.25          |
| 17 | ChilledDomineering("....","....","x..x","..xx") | $\{\{\wedge\}v^*,\{\wedge\}v^*,\{\wedge\}v\},\{*,\wedge\},\{0\}v^*\}\{v^*,v^*,\{0,v^*,\star\}v^*,v^3\},\{\{\wedge\}v\},\{\wedge\},\{\wedge\}v^*\}v^*\}$ | -0.5           |
| 18 | ChilledDomineering("....","....","x..x","x..x") | $\{\uparrow^+0,*\}$   | 0              |
| 19 | ChilledDomineering("....","....","x.xx","...x") | $\{\wedge,\{\wedge\}0,\{\wedge\}0,*\},\{\wedge\},\{\wedge\},\{\wedge\}v^*\}\{*,\wedge\},\{0,\wedge\}v^*\}\{*,v\}\{*,v\},\{0,*\}v^*,\{0,v^*\}v^*\}$      | 0              |
| 20 | ChilledDomineering("....","....","x.xx","x...") | $\{\wedge\}0,\{\wedge\}0,*\}\{v^*,v^3\}$  | $\{-0.5\}-1\}$ |
| 21 | ChilledDomineering("....","...x","....",".xxx") | $\{\{*,\wedge\}v^*\},\{\wedge\},\{\wedge\}0,v^*\}v^*\}$   | -1             |
| 22 | ChilledDomineering("....","...x","....","x.xx") | $\{\{\wedge\} \uparrow^+0\},\{0,\wedge\}v^*,v^*\}\{PowTo((v^*),2)\}$  | -1             |
| 23 | ChilledDomineering("....","...x","....","xx.x") | $\{0,\{\wedge\},\{\wedge\}v\}v^*,v^*\}$   | -1             |
| 24 | ChilledDomineering("....","...x","....","xxx.") | $\{\wedge,\{\wedge\}0\}\{*,\{*,v^3\}v^3\},\{\wedge\}0,*\}\{0\}$   | 0              |
| 25 | ChilledDomineering("....","...x","...x","x..x") | $\{\wedge\}v^*\{v^*,\{0,v^*,\star\}v^*,v^*\}v^3\}$  | *              |
| 26 | ChilledDomineering("....","...x","...x","xx..") | $\{\wedge\}v^3\}$   | $\{0\}-1\}$    |
| 27 | ChilledDomineering("....","...x","..xx","x...") | $\{0,\{\wedge\}0\}v^4\}$  | $\{-0.5\}-2\}$ |
| 28 | ChilledDomineering("....","...x","..x","..xx")  | $\{v^*,\{v^*,v^3\}v^4\}$  | -2.5           |
| 29 | ChilledDomineering("....","...x",".x..","x..x") | $\{0,*\}0,\wedge\}$   | 1              |
| 30 | ChilledDomineering("....","...x",".x..","xx.")  | $\{0\}^*,Pow(\wedge,2)\}$   | 1              |
| 31 | ChilledDomineering("....","...x",".x..","x..x") | $\{\star\}0\}$  | -1             |
| 32 | ChilledDomineering("....","...x",".x..","xx..") | $\{0,\star,\{\wedge\}0,\{0,*\}v^*\}\{v^*,\{0,v^*,\star\}v^*,v^*\}v^3\}$   | -1             |
| 33 | ChilledDomineering("....","...x","x.x","...x")  | $\{0,*\}v\}$  | 0              |
| 34 | ChilledDomineering("....","...x","x.x","x..")   | $\{0,*\}v\}$  | 0              |
| 35 | ChilledDomineering("....","...x","x.x","x...")  | $\{\wedge\}v^*,\wedge\}$  | 1              |
| 36 | ChilledDomineering("....","...x",".xxx","....") | $\{\wedge\}v\}\{v^*,\{0,v^*,\star\}v^*,v^*\}v^3\}$  | -1             |
| 37 | ChilledDomineering("....","...x","x...","..xx") | $\{v^*,\{\wedge\}v\}v^4\}$  | -2*            |
| 38 | ChilledDomineering("....","...x","x...","x..x") | $\{\wedge,\wedge\}v^*,\wedge,+(-,*\}\{0,v^*,\{0,v^*,\star\}v^*,v^*\}v^3\}$  | 0              |
| 39 | ChilledDomineering("....","...x","x...","x..x") | $\{\wedge\}v^*,\{\wedge\}v^*,\wedge\}$  | 2              |
| 40 | ChilledDomineering("....","...x","x...","xx..") | $\{+(-,*\},\{\wedge,\wedge\}v^*,\wedge,+(-,*\})\{\wedge\}0<2>\},\{0,v^*,\{0,v^*,\star\}v^*,v^*\}v^3\}$  | 0              |
| 41 | ChilledDomineering("....","...x","x..x","...x") | $\{\wedge\}v^*,\{\wedge\}v\}$   | 0.5            |
| 42 | ChilledDomineering("....","...x","x..x","x...") | $\{0\}0\}^*,\wedge\}\{v^*,v^*\}0\}$   | $\{1\}0\}$     |
| 43 | ChilledDomineering("....","...x","x.x","x...")  | $\{\wedge\}v\}$   | 1*             |
| 44 | ChilledDomineering("....","...x","x.xx","....") | $\{*,v\}v^4\}$  | -2*            |
| 45 | ChilledDomineering("....","...x","xx..","...x") | $\{0\}v^3\}$  | -1             |
| 46 | ChilledDomineering("....","...x","xx..","x...") | $\{0,\{\wedge\}v^*\}v^*\}$  | -1             |
| 47 | ChilledDomineering("....","...x","xx.x","....") | $\{v\}v^3\}$  | -2             |

|    |  |  |         |
|----|--|--|---------|
| 48 | ChilledDomineering("....","..x","....","x.xx") | $\text{PowTo}(v,2)^{+*}$   | -1      |
| 49 | ChilledDomineering("....","..x","....","xx.x") | $\{\wedge 4 \parallel \text{PowTo}((v v^*), 2)\}$  | {0.5 0} |
| 50 | ChilledDomineering("....","..x","....","xxx.") | $\wedge$   | 1       |
| 51 | ChilledDomineering("....","..x","...x","x..x") | $\{\{\wedge, \wedge^3   \wedge^*, \wedge, \{\wedge^*, \wedge   0, \wedge^*, \star\}, \{\wedge^3   \{\wedge^*   0, *\}, \{\wedge   \{\wedge   0, v^*\}, \star\}, \{\wedge^*, \wedge   0, \wedge^*, \star\}\}   \{\wedge^*, \{\wedge   \{\wedge   0, v^*\}, \star\}   \{v v\}, \{0, v^*, \star   v^*, v v\}\}, \{\wedge, \wedge^*   \wedge, +(-(*, \wedge))   0, \{0, v^*, \star   v^*, v v\}\}\}$ | 1       |
| 52 | ChilledDomineering("....","..x","...x","xx..") | $\{*, v   v   v^3\}$   | -1      |
| 53 | ChilledDomineering("....","..x","..x","x..x")  | $\{\wedge^*   *, \{\wedge^*   v v\}\}$   | 1       |
| 54 | ChilledDomineering("....","..x","..x","x.x.")  | $\wedge$   | 1       |
| 55 | ChilledDomineering("....","..x","..x","xx..")  | $\{\wedge^*   v^*\}$   | 0.5     |
| 56 | ChilledDomineering("....","..x","..xx","x..")  | $\{0, \{\wedge^*, \{\wedge   \{\wedge   0, v^*\}, \star\}   \{v v\}, \{0, v^*, \star   v^*, v v\}\}   v   v^3\}$   | -1      |
| 57 | ChilledDomineering("....","..x","..x","..xx")  | $\{0   v^4\}$  | -2*     |
| 58 | ChilledDomineering("....","..x","..x","x..x")  | $\{\wedge^3   \wedge, \{\wedge^*, \wedge   *, \{\wedge^*   0, *\}, \{\wedge, \wedge^*   v, \{\wedge   0, v^*\}\}\}\}$  | 2       |
| 59 | ChilledDomineering("....","..x","..x","..xx")  | $\{\wedge^3   *, \wedge^3   \wedge, \{\wedge   *, \{0, \wedge^*   *, v\}\}\}$  | 2       |
| 60 | ChilledDomineering("....","..x","..x","x..x")  | $v$  | -1      |
| 61 | ChilledDomineering("....","..x","..x","xx..")  | $\{\{\wedge^3   *\}, \{\wedge^3   \{\wedge^*   0, *\}, \{\wedge   \{\wedge   0, v^*\}, \star\}, \{\wedge^*, \wedge   0, \wedge^*, \star\}\}   \{*, v   v v\}, \{\wedge   0, \{0, v^*, \star   v^*, v v\}\}, \{\wedge^*, \{\wedge   \{\wedge   0, v^*\}, \star\}   \{v v\}, \{0, v^*, \star   v^*, v v\}\}\}$   | 0.5     |
| 62 | ChilledDomineering("....","..x","..xx","...x") | $\pm \text{PowTo}((\wedge^*), 2)$  | *       |
| 63 | ChilledDomineering("....","..x","..xx","..x.") | $\{\wedge^*, \{0   0, *   v v\}   v, v^*   v^3\}$  | -0.5    |
| 64 | ChilledDomineering("....","..x","..xx","x..")  | $\wedge \wedge$  | 2       |
| 65 | ChilledDomineering("....","..x","..xx","x...") | $\{0   *, \wedge\}$  | 1       |
| 66 | ChilledDomineering("....","..x","x..","..xx")  | $\{v   v^4\}$  | -2.5    |
| 67 | ChilledDomineering("....","..x","x..","x..x")  | $\{\wedge^3, \wedge^4   \wedge^*, \{\wedge^*   *, \wedge\}   v^*\}$  | 0.75    |
| 68 | ChilledDomineering("....","..x","x..","x.x.")  | $\{\wedge^3   \wedge^*, \wedge   *\}$  | 1       |
| 69 | ChilledDomineering("....","..x","x..","xx..")  | $\star$  | 0       |
| 70 | ChilledDomineering("....","..x","x..x","...x") | $\{\wedge^3   *   0, \{\wedge, \wedge^*   \wedge, +(-(*, \wedge))   0, \{0, v^*, \star   v^*, v v\}\}\}$   | 0       |
| 71 | ChilledDomineering("....","..x","x..x","x...") | $\{\{\wedge, \wedge^*   \wedge, +(-(*, \wedge)), \{\wedge^*, \wedge^3   \wedge^*, \{\wedge^*   0, *\}\}   \wedge, \wedge^*   \wedge, +(-(*, \wedge))   0, \{0, v^*, \star   v^*, v v\}\}\}$  | 1       |
| 72 | ChilledDomineering("....","..x","x.x","...x")  | $\{\wedge^3   \wedge   0, *\}$   | 1.5     |
| 73 | ChilledDomineering("....","..x","x.x","..x.")  | $\{\{\wedge^*   0\}, \{0   0, *   v v\}   v, v^*   v^3\}$  | -0.5    |
| 74 | ChilledDomineering("....","..x","x.x","x...")  | $\{\wedge^3   *, \{\wedge^3   \{\wedge   *\}, \{\wedge^3   *\}\}   0, \wedge^*\}$  | 1.5     |
| 75 | ChilledDomineering("....","..x","x.xx","....") | $\{*, \{\wedge^*   \wedge^*   v v^*\}   v   v^3\}$   | -1      |
| 76 | ChilledDomineering("....","..x","xx..","...x") | $\{v^*, \{\wedge^*   v^*\}   v v^*\}$  | -1      |

|     |   |  |      |
|-----|---|--|------|
| 77  | ChilledDomineering("....","..x","xxx","....")     | 0  | 0    |
| 78  | ChilledDomineering("....","..xx","....","x..x")   | $\{\{^{\wedge}0,*\},\{^{\wedge}*,\text{Pow}(v,2)\}0\}v4$   | -2*  |
| 79  | ChilledDomineering("....","..xx","....","x..x")   | $\{0,\{^{\wedge}0,*\}v\}$  | -1   |
| 80  | ChilledDomineering("....","..xx","....","xx..")   | $\{\wedge,\{^{\wedge}0,*\}v3^*\}$  | -1*  |
| 81  | ChilledDomineering("....","..xx","..x","x..")     | $\{\{^{\wedge}0,*\},\{^{\wedge}*,\text{Pow}(v,2)\}0\},\{^{\wedge}*,\{^{\wedge}\wedge,*\}^{\wedge}\}v\}v\}$   | -1   |
| 82  | ChilledDomineering("....","..xx","..x","x..")     | $\{\wedge^*\ \wedge^*v\ \ \wedge^*v\}$   | -1.5 |
| 83  | ChilledDomineering("....","..xx","x..","x..")     | $\{0\}v3$  | -1.5 |
| 84  | ChilledDomineering("....","..xx","x..","..x")     | $v\}$  | -2   |
| 85  | ChilledDomineering("....","..xx","x..","x..")     | $+\wedge^3$  | -1   |
| 86  | ChilledDomineering("....","..xx","x..x","....")   | $\{v,\{^{\wedge}*\}v\}v3$  | -2   |
| 87  | ChilledDomineering("....","..xx","x..x","....")   | $\{0\ \ \wedge^*,v\}v\}v3^*\}$   | -1   |
| 88  | ChilledDomineering("....","..x","....","..x")     | 0  | 0    |
| 89  | ChilledDomineering("....","..x","....","..x")     | $\{0,\wedge^*\}v$  | 0    |
| 90  | ChilledDomineering("....","..x","....","x..x")    | v  | -1   |
| 91  | ChilledDomineering("....","..x","....","x..x")    | $\wedge$   | 1    |
| 92  | ChilledDomineering("....","..x","....","xx..")    | $\{v,v^*,\{*,v\}v\},\{0,*\}v,v^*,\{0,v^*\}v,v^*\}v\}$  | -2   |
| 93  | ChilledDomineering("....","..x","..x","x..")      | $+(\wedge^*)$  | *    |
| 94  | ChilledDomineering("....","..x","..x","x..")      | $\{0,\{^{\wedge}\}v\}v,v^*\}$  | -1   |
| 95  | ChilledDomineering("....","..x","..x","..x")      | v  | -1   |
| 96  | ChilledDomineering("....","..x","..x","..x")      | $\wedge$   | 1    |
| 97  | ChilledDomineering("....","..x","..x","..x")      | $\{\{\wedge^*0,\{*,^{\wedge}0,v^*\}\},\{\wedge^*,\wedge^*,\{\wedge^*\}^{\wedge}\}^{\wedge},\{\wedge^*,\wedge^*,\{0,\wedge^*v\}^{\wedge}\}^{\wedge}\}v\}v\}v\}$                             | 0    |
| 98  | ChilledDomineering("....","..x","..x","x..")      | $\{\wedge^*,\{\wedge^*,\wedge^*\}^{\wedge},\{\wedge^*,\wedge^*\}^{\wedge},\{\wedge^*,\wedge^*\}^{\wedge},\{\wedge^*,\wedge^*\}^{\wedge},\{\wedge^*,\wedge^*\}^{\wedge}\}^{\wedge}\}v\}v\}$ | 1    |
| 99  | ChilledDomineering("....","..x","..x","....")     | $\{0\}^{\wedge^*}$   | 3    |
| 100 | ChilledDomineering("....","..x","..xx","....")    | $\{0,*\}v$   | -1   |
| 101 | ChilledDomineering("....","..x","x..","..x")      | 0  | 0    |
| 102 | ChilledDomineering("....","..x","x..","..x")      | $\{\{\wedge^*0,*\},\{0\}^{\wedge^*}\}v\}$  | 0    |
| 103 | ChilledDomineering("....","..x","x..","x..")      | $\{\wedge^*,\{\wedge^*\}^{\wedge}\}v\}$  | *    |
| 104 | ChilledDomineering("....","..x","x..x","....")    | 0  | 0    |
| 105 | ChilledDomineering("....","..xx","....","x..x")   | $\{\{\wedge^*,\wedge^*\}^{\wedge},+(\wedge^*)\}v\}$  | -1.5 |
| 106 | ChilledDomineering("....","..xx","..x","x..")     | $\{*,v\}v\},\{v^*,\{^{\wedge}0,v^*\}0\}$   | -1   |
| 107 | ChilledDomineering("....","..xx","..x","x..")     | $\star$  | 0    |
| 108 | ChilledDomineering("....","..xx","..xx","....")   | *  | 0    |
| 109 | ChilledDomineering("....","..xxx","....","x..")   | $\{\{\wedge^*v\},\{\wedge^*,\wedge^*\}^{\wedge},\{\wedge^*0,*\},\{\wedge^*,\wedge^*\}^{\wedge}\}^{\wedge}\}v\}$  | -0.5 |
| 110 | ChilledDomineering("....","..x..x","....","..xx") | $\{v,v^*,\{v,v^*\}v\}v\}$  | -2   |

|     |  |   |             |
|-----|--|---|-------------|
| 111 | ChilledDomineering("....","x.x","....",".x.x")   | $\{0,\{0,* 0,*\} 0,\text{PowTo}(v,2)+*\}$   | 0           |
| 112 | ChilledDomineering("....","x.x","....",".xx.")   | $\{0,* *,\text{Pow}(v,2)\}$   | 1           |
| 113 | ChilledDomineering("....","x.x","....","x.x")    | $\{0,v* 0,v* 10\}$  | -2          |
| 114 | ChilledDomineering("....","x.x","...x","...x")   | $\{\wedge* 0  \text{PowTo}((v3*),2)\}$  | -1*         |
| 115 | ChilledDomineering("....","x.x","...x",".x.")    | $\{*,\{*,\wedge 0,v*\} \text{PowTo}(v,2)\}$   | -1          |
| 116 | ChilledDomineering("....","x.x","...x","x..")    | 0   | 0           |
| 117 | ChilledDomineering("....","x.x",".x.", "x..")    | $\text{PowTo}(vv,2)$  | -2          |
| 118 | ChilledDomineering("....","x.x","x.x","....")    | vv  | -2          |
| 119 | ChilledDomineering("....","x.xx","....","...x")  | $\{v,v* v4\}$   | -2.5        |
| 120 | ChilledDomineering("....","x.xx","....",".x.")   | $\{*,v,\{0,* v,v*\} v3\}$   | -1.5        |
| 121 | ChilledDomineering("....","x.xx","....",".x.")   | $\{\wedge vv\}$   | -0.5        |
| 122 | ChilledDomineering("....","x.xx","....","x..")   | $\{0,\star v4\}$  | -2*         |
| 123 | ChilledDomineering("...x","....","....","x.xx")  | $\{\wedge^3* \wedge,\{\wedge* \star,\star\},\{\wedge*,\wedge 0,\wedge*,\star\}  vv*\}$  | *           |
| 124 | ChilledDomineering("...x","....","....","xx.x")  | $\{\wedge*,\wedge 0,\{0,* v\},\{\wedge v3*,v3\},\{0,* v3*\}\}$  | 1           |
| 125 | ChilledDomineering("...x","....","....","xxx.")  | $\{*,\{\wedge v*\},\{\wedge* \{*,v,+(*,\wedge) v,vv*\}\}  v v3*\}$  | -1          |
| 126 | ChilledDomineering("...x","....","...x","xx..")  | $\{0,\{\wedge*,\wedge vv\},\{0,* v,v*\} vv,\{v,\{0,v*,\star v*,vv\},\{\star,\star vv\} v3*\}\}$   | -1          |
| 127 | ChilledDomineering("...x","....",".x.", "x..x")  | *   | 0           |
| 128 | ChilledDomineering("...x","....",".x.", "x.x.")  | $\{\wedge^4 0,\{\wedge v3\}\}$  | $\{2 1*\}$  |
| 129 | ChilledDomineering("...x","....",".x.", "xx..")  | $\{\wedge^3*  * v3*\}$  | $\{1 0.5\}$ |
| 130 | ChilledDomineering("...x","....",".x.", "x..x")  | $\{0,v*,\{\{\wedge*,\wedge 0,\wedge*,\star\},\{\wedge v*  v*\} 0,v*,\{0,v*,\star v*,vv\},\{\star,\{\wedge v*  v*\} v,v*\}  v,\{0,v*,\star v*,vv\},\{\star,\star vv\} v3*\}\}$ | -1          |
| 131 | ChilledDomineering("...x","....",".x.", "xx..")  | $\{\wedge*  v,\{0,v*,\star v*,vv\},\{\star,\star vv\} v3*\}$  | *           |
| 132 | ChilledDomineering("...x","....",".x.x", "x..")  | 0   | 0           |
| 133 | ChilledDomineering("...x","....",".xx.", "x..")  | v   | -1          |
| 134 | ChilledDomineering("...x","....","x..", ".xx")   | $\{v*,\{\wedge,\wedge* v*\} v3*,\{v*,vv,\{0,v*,\star v*,vv\} vv,v3*\}\}$  | -1.25       |
| 135 | ChilledDomineering("...x","....","x..", "x..x")  | $\{\wedge,\{\wedge*,\text{PowTo}(\wedge,2)*,\wedge,\{\wedge,\uparrow^{+*} *,v\}\} 0,\{\wedge vv\}\}$  | 0           |
| 136 | ChilledDomineering("...x","....","x..", "x.x.")  | $\{\wedge*,\wedge^3 vv*\}$  | $\{1 0\}$   |
| 137 | ChilledDomineering("...x","....","x..", "xx..")  | $+-\text{PowTo}((\wedge^3*),2)$   | -1          |
| 138 | ChilledDomineering("...x","....","x.x", "...x")  | $\{\{\wedge^3* *\},\{\wedge^3 0\}  v*,vv,\{0,v*,\star v*,vv\} vv,v3*\}$   | -0.25       |
| 139 | ChilledDomineering("...x","....","x.x", "x..")   | $\{\{0,* v\},\uparrow^{+*} v*,vv,\{0,v*,\star v*,vv\} vv,v3*\}$   | -0.5        |
| 140 | ChilledDomineering("...x","....","x.x.", "...x") | $\{\{\wedge*  *\},\{\wedge^3 v\},\{\wedge*,\wedge,\{\wedge*  *\} \wedge,\{\wedge,\wedge*,\{0,* v\} *,v\}\} \wedge*,v\}$   | 0           |
| 141 | ChilledDomineering("...x","....","x.x.", ".x.")  | $\{\wedge^3 v3*\}$  | -1          |
| 142 | ChilledDomineering("...x","....","x.x.", "x..")  | $\{\wedge^3 0,\{0 v3\}\}$   | $\{1 0.5\}$ |

|     |  |  |       |
|-----|--|--|-------|
| 143 | ChilledDomineering("...x","....","xx..","...x")  | $+-(\wedge^*,\{\wedge^3*\wedge^*,\wedge^*,\{\wedge^*,\wedge^0,\wedge^*,\star\}\})$   | *     |
| 144 | ChilledDomineering("...x","...x","....","xx..")  | 0  | 0     |
| 145 | ChilledDomineering("...x","...x",".x..","x..")   | $\{\wedge^*\ \wedge^*,\wedge^0\}$  | *     |
| 146 | ChilledDomineering("...x","...x","x...","...x")  | $\{\wedge^3,\{\wedge^3\}\ \wedge^*\}$  | {110} |
| 147 | ChilledDomineering("...x","...x","x...",".x..")  | $\{\wedge^3*\wedge^*,\{\wedge^*\wedge^*,\wedge^*\}\ \wedge^3\}$  | -1    |
| 148 | ChilledDomineering("...x","...x","x...","x..")   | *  | 0     |
| 149 | ChilledDomineering("...x",".x..","....","x..x")  | 0  | 0     |
| 150 | ChilledDomineering("...x",".x..","....","x..x")  | $\{\wedge^*\ \wedge^*\}$   | 0     |
| 151 | ChilledDomineering("...x",".x..",".x..","x..")   | *  | 0     |
| 152 | ChilledDomineering("...x",".x..","x...","...x")  | $\{\wedge^*\wedge^*,\wedge^*\ \wedge^*\}$  | -0.5  |
| 153 | ChilledDomineering("...x",".x..","x...",".x..")  | vv   | -2    |
| 154 | ChilledDomineering("...x","x...","....","..xx")  | $\{*,\{\wedge^*,\wedge^*,\{\wedge^*\}\}*,\wedge^*,\{\wedge^*,\wedge^*,\{0,\wedge^*\wedge^*\}\}*\},\{*,\wedge^*,\wedge^*,\wedge^*\},\{0,\wedge^*\wedge^*\},\{0,\wedge^*\wedge^*\},\{0,\wedge^*\wedge^*\}\}$   | 0     |
| 155 | ChilledDomineering("...x","x...","....",".x..x") | $\{\wedge^*,\wedge^*,\{\wedge^*\wedge^*,\wedge^*,\{\wedge^*,\wedge^0,\wedge^*,\star\}\}\}\ \wedge^*,\star\}$   | 1     |
| 156 | ChilledDomineering("...x","x...","....","..xx")  | $\{*,\{\wedge^*\wedge^*,\{\wedge^*\wedge^*\}\}\ \wedge^*\}$  | -1    |
| 157 | ChilledDomineering("...x","x...","....","x..x")  | $\{0,\{\wedge^3\}\ \wedge^*,\{\wedge^3\}\}$  | 0     |
| 158 | ChilledDomineering("...x","x...","....","x..x")  | 0  | 0     |
| 159 | ChilledDomineering("...x","x...",".x..",".x..")  | *2   | 0     |
| 160 | ChilledDomineering("...x","x...",".x..","x..")   | 0  | 0     |
| 161 | ChilledDomineering("...x","x...",".x..",".x..")  | $\{\wedge^*,\{\wedge^3*\wedge^*\}\ \wedge^*,\{\wedge^*\wedge^*\}$  | 1     |
| 162 | ChilledDomineering("...x","x...","x...","...x")  | $\{\wedge^4\ \wedge^*,\{\wedge^*\wedge^*\}\}$  | 2.25  |
| 163 | ChilledDomineering("...x","x..x","....",".x..")  | $\{\wedge^3*\wedge^*,\{\wedge^*,\wedge^0,\wedge^*,\star\}\}\ \{*,\wedge^0,\wedge^*,\{0,\wedge^*,\{\wedge^*,\wedge^0,\wedge^*,\star\}\}\}\ \{0,\wedge^*,\wedge^*\wedge^*,\wedge^*\}\}$  | 1     |
| 164 | ChilledDomineering("...x","x..x","....",".x..")  | $\{\{0\ \{\wedge^*,\wedge^0,\wedge^*,\star\},\{0\ \wedge^*,\star\}\},\{\wedge^*\wedge^*,\wedge^*,\{\wedge^*,\wedge^0,\wedge^*,\star\}\}\ \{0,\wedge^*,\{\wedge^*,\wedge^0,\wedge^*,\star\}\}\ \{0,\wedge^*,\star\wedge^*,\wedge^*\},\{\wedge^*\ \wedge^*\wedge^*\},\{0\ \wedge^*,\star\}\ \{0,\wedge^*,\star\wedge^*,\wedge^*\}\}\}$ | 1     |
| 165 | ChilledDomineering("x..x","....","....","x..x")  | *  | 0     |

4x4 大小的 13 格空格盘面

| Num | Position  | Value  | Atomic Weight |
|-----|---|--|---------------|
| 1   | ChilledDomineering("....","....","....",".xxx") | $\{\{\wedge^4*\ \wedge^0,\wedge^*\},\{\wedge^4*\ \text{Pow}(v,2)\}\ \{\wedge^0,\wedge^*\ \wedge^4\},\{\wedge^0,\wedge^*\}\}\ \wedge^0\}$ | {*-1}         |
| 2   | ChilledDomineering("....","....","....","x.xx") | $\{\{\wedge^4*\ \wedge^0,\wedge^*,\star\}\ \wedge^*,\wedge^0\},\{\wedge^4*\ \wedge^0,\wedge^*\}\ \{\text{PowTo}(v,2)+\wedge^0\}\}$       | -1            |



|    |   |   |                 |
|----|---|---|-----------------|
| 3  | ChilledDomineering("....", "....", "...x", ".xx")   | $+( \uparrow^{+*}, \{PowTo(\wedge, 2)   \star, \{0, *10, \{0, *lvv\}\}, \{0, \{\wedge 10\}10, \star, \{\{\wedge, \wedge 3 * \wedge, \{\wedge 10, *\}\}, \{\wedge 3 10\}10, \{0, \{\wedge lvv\}lvv\}\})$   | 0               |
| 4  | ChilledDomineering("....", "....", "...x", ".x.x")  | $\{\wedge 3 * lv\}$   | 1*              |
| 5  | ChilledDomineering("....", "....", "...x", ".x..x") | $\{\{\wedge \wedge, \{\wedge 3 * 10, \{0, *lvv\}\}10, v^*, \{\wedge 3 * \{\wedge 3 * \wedge 3   \wedge \wedge, \{\wedge \wedge, \wedge 10, \wedge *\}\}   \wedge \wedge, \star\}, \{\wedge, \wedge 3 *   *, Pow(v, 2)\}   \{\star lv 4 * \}, \{Pow(v, 2), \{\wedge, \{\wedge 10, *\}10, *\}lv 4 * \}\}$ | 0               |
| 6  | ChilledDomineering("....", "....", "...x", ".xx..") | $\{\wedge, \wedge 3 *   *, Pow(v, 2)   lv, vv * lv 4\}$   | $\{-0.5   -1\}$ |
| 7  | ChilledDomineering("....", "....", ".x.", ".xx")    | $\{\wedge *, \{\wedge *, \wedge 10, \wedge *, \star\}   v 3\}$  | -1*             |
| 8  | ChilledDomineering("....", "....", ".x.", ".xx.")   | $\{\wedge 3 *   \{\wedge 10, \{\wedge 1 v\}   lv v^*\}, \{0, \{\wedge 1 v\}   v\}\}$  | 1.25            |
| 9  | ChilledDomineering("....", "....", ".x.", ".x..x")  | $vv^*$  | -2              |
| 10 | ChilledDomineering("....", "....", ".x.", ".x..x")  | $\{\wedge 3 *, \{\wedge 3 *   \wedge *, \wedge\}   10, \wedge *\}$  | 1.5             |
| 11 | ChilledDomineering("....", "....", ".x.", ".xx..")  | $\{\wedge 3 *, \{\wedge 3   \wedge *\}   *   lv v, \{v, v *   v 3\}   v 4 *, v 4\}$   | $\{-0.5   -1\}$ |
| 12 | ChilledDomineering("....", "....", ".xx", ".x..")   | $\{\wedge 4 *   10   v 3 *\}$   | $\{ *   -1\}$   |
| 13 | ChilledDomineering("....", "....", ".x.x", ".x..x") | $\{\{\wedge 4   \wedge\}, \{0 < 2 >   10, *   v\}   PowTo(v, 2)\}$  | 0.75            |
| 14 | ChilledDomineering("....", "....", ".x.x", ".x..")  | $\{\wedge \wedge *, \{\wedge \wedge *   Pow(\wedge, 2)\}   10, v^*\}$   | 0.5             |
| 15 | ChilledDomineering("....", "....", ".x.x", ".x..")  | $\{\{\wedge *, \wedge 10, \wedge *, \star\}, \{\wedge 3 *   \{\wedge \wedge *   10, *\}, \{\wedge   \{\wedge 10, v^*\}, \star\}, \{\wedge *, \wedge 10, \wedge *, \star\}\}   v 3\}$  | $\{0   -1\}$    |
| 16 | ChilledDomineering("....", "....", ".xx.", ".x..x") | $\{0   10, v^*, \star   v^*, vv   lv 5\}$   | $\{-2   -3\}$   |
| 17 | ChilledDomineering("....", "....", ".xx.", ".x..")  | $\{\wedge   *   10, \{\wedge   vv\}\}$  | 0               |
| 18 | ChilledDomineering("....", "....", ".xxx", ".x..")  | $\{\wedge \wedge * *, \wedge   \star   lv 4 *\}$  | 0               |
| 19 | ChilledDomineering("....", "....", ".x.x", ".x..x") | $\{\wedge 4 *   \star   lv *, \star\}$  | 0               |
| 20 | ChilledDomineering("....", "....", ".x.xx", ".x..") | $\{\{\wedge \wedge *   v^*, \{\wedge *   v\}\}, \{0, \wedge *, \{0, \wedge *   v\}   lv v\}   lv v, v 3 *\}$  | -1.25           |
| 21 | ChilledDomineering("....", "...x", "....", ".x..x") | *   | 0               |
| 22 | ChilledDomineering("....", "...x", "....", ".xx.")  | $\{PowTo(\wedge, 2)   10, \{0, \star, \{\wedge   *, v\}   lv 4 *\}, \{\wedge   v 4 *\}\}$   | 0.5             |
| 23 | ChilledDomineering("....", "...x", "....", ".x..x") | $\{*, v   * *, v   10   lv v^*, \{*, v, +(-*, \wedge)   v, vv *\}   v 3\}$  | -2              |
| 24 | ChilledDomineering("....", "...x", "....", ".x..x") | $\{0, \{\wedge, \{\wedge 10, \wedge *\}   10, \wedge *\}   10, \{*, \{\wedge, \wedge *   *, \wedge, +(-*, \wedge)\}   *, v\}\}$   | 1               |
| 25 | ChilledDomineering("....", "...x", "....", ".xx..") | $\{\{\wedge 3 *   v, \{*, \wedge   v, v^*\}\}, \{\wedge \wedge *   10, v^*, \star   v^*, vv\}   lv *, vv   v 4\}$   | -1              |
| 26 | ChilledDomineering("....", "...x", "...x", ".x..")  | $\{\wedge, \{\wedge *   10\}   lv v\}$  | *               |
| 27 | ChilledDomineering("....", "...x", ".x.", ".x..")   | $\{\{\wedge \wedge *   v^*\}, \{\wedge \wedge *   v\}   v 3\}$  | -1.25           |
| 28 | ChilledDomineering("....", "...x", ".x..", ".x..x") | $vv^*$  | -2              |
| 29 | ChilledDomineering("....", "...x", ".x..", ".x..")  | $\{\{0   \wedge, +(-*, \wedge)\}, \{\wedge \wedge *   10\}   lv *, vv   10\}$   | -0.5            |
| 30 | ChilledDomineering("....", "...x", ".x..", ".x..")  | $\{\wedge 4 *   10, \wedge *   v   10, v *   lv v\}$  | 0               |
| 31 | ChilledDomineering("....", "...x", ".x..", ".x..")  | $v$   | -1              |
| 32 | ChilledDomineering("....", "...x", ".x.x", ".x..")  | $\{\{\wedge 4 *   v\}, \{0, \wedge *   * *, v   lv v\}   v 3\}$   | $-1 + Miny(1)$  |

|    |  |   |                    |
|----|--|---|--------------------|
| 33 | ChilledDomineering("....", "...x", ".xx.", "...")  | $\{*, \star  vv, \{\{^* v\}, \{^* vv^*\} vv^*\}\}$  | -1                 |
| 34 | ChilledDomineering("....", "...x", "x...", "...x") | $\{\wedge, \{0, * 0, ^*\} vv\}$   | -0.5               |
| 35 | ChilledDomineering("....", "...x", "x...", ".x.")  | $\{\{\wedge   \star, \{0, ^* v\} vv\}, \{\wedge  0, \{*, \wedge  0, v^*\}\} vv\}$   | 0                  |
| 36 | ChilledDomineering("....", "...x", "x...", "x...") | $\{\wedge^3, \wedge^4  0  vv^* v4^*\}$  | $\{*-0.5\}$        |
| 37 | ChilledDomineering("....", "...x", "x.x", "...")   | $\{v, \{^* v\}, \{0, v^* 0, *\} v3\}$   | -1.5               |
| 38 | ChilledDomineering("....", "...x", "x.x.", "...")  | $\{*, \wedge  vv, \{^* v  0\}\}$  | -0.5               |
| 39 | ChilledDomineering("....", "...x", "xx.", "...")   | vv  | -2                 |
| 40 | ChilledDomineering("....", ".x.", "...", "x.x")    | $\{\{^4 v\}, \{\wedge^*  \wedge, +(*, \wedge), \{\wedge, ^* v, \{\wedge  0, v^*\}\}\}  \wedge  0, * 0 <2>\}$  | -0.5               |
| 41 | ChilledDomineering("....", ".x.", "...", "x.x.")   | $\{\wedge   \star, \{*, \wedge  0, v^*\}\}$   | 1                  |
| 42 | ChilledDomineering("....", ".x.", "...", "xx.")    | $\{\{\wedge  0, *\}, \{\wedge^*, \{\wedge^3  ^*\}  \wedge  v3\}, \{\wedge^* v3\}\}  \wedge  0, * 0 <2>\}$   | -0.5               |
| 43 | ChilledDomineering("....", ".x.", "...x", "x...")  | $\{\wedge   \{\wedge  0, v^*\}, \star\}$  | 1                  |
| 44 | ChilledDomineering("....", ".x.", ".x.", "x...")   | $\{\wedge^3  v^*\}$   | 1*                 |
| 45 | ChilledDomineering("....", ".x.", ".x.", ".x...")  | *   | 0                  |
| 46 | ChilledDomineering("....", ".x.", ".x.", ".x.")    | + - ^ ^   | *                  |
| 47 | ChilledDomineering("....", ".x.", ".x.", ".x.")    | $\{\wedge^3, \{\wedge   \wedge\}, \{\wedge^4, \wedge^4   \wedge, \{\wedge^3   \wedge, ^*\}\}  \{\wedge^*, \wedge  0, \wedge^*, \star\}, \{\wedge^*, \wedge  0, \{\wedge  0, v^*\}\}, \{\wedge^*   \star, \star\}\}$ | 2                  |
| 48 | ChilledDomineering("....", ".x.", ".x.", "x...")   | +-(0, {\wedge^* 0, \wedge^*})   | 0                  |
| 49 | ChilledDomineering("....", ".x.", ".xx.", "...")   | 0   | 0                  |
| 50 | ChilledDomineering("....", ".x.", "x...", "...x")  | $\{\wedge, \{\wedge, \wedge^3  ^*\}, \text{Pow}(v, 2), \{\wedge^*, \wedge  0, *\} v, \{\wedge, +(*, \wedge), \{\wedge, ^* v, \{\wedge  0, v^*\}\} 0, \{0 v3\}\}\}$  | 0.5                |
| 51 | ChilledDomineering("....", ".x.", "x...", ".x.")   | $\{\wedge  vv\}$  | -0.5               |
| 52 | ChilledDomineering("....", ".x.", "x.x", "...")    | $\{\text{Pow}(v, 2), \{\wedge^* v\}, \{\wedge^* v^*, \{\wedge^* v\}\} vv, \{\text{Pow}(v, 2) \text{PowTo}((vv^*), 2)\}\}$   | -1                 |
| 53 | ChilledDomineering("....", ".x.", "x.x.", "...")   | $\{0   \wedge^*, \wedge  0, v^* 0, *\}$   | 1*                 |
| 54 | ChilledDomineering("....", ".xx", "...", "x...")   | $\{\{\wedge, \{\wedge  0, \wedge^* 0, \wedge^*\}, \{\wedge^*, \wedge  0, \wedge^*, \star  0\}\} v5\}$   | $\{-1  -3\}$       |
| 55 | ChilledDomineering("....", ".x.x", "...", ".x.")   | +-(*, ^)  | 0                  |
| 56 | ChilledDomineering("....", ".x.x", "...", "x...")  | $\{\wedge  vv\}$  | -0.5               |
| 57 | ChilledDomineering("....", ".x.x", "...", "...x")  | $\{\text{Pow}(v, 2) \text{PowTo}(v3, 2)\}$  | -1.5               |
| 58 | ChilledDomineering("....", ".x.x", "...", ".x.")   | *   | 0                  |
| 59 | ChilledDomineering("...x", "...", "...", "x.x")    | $+-(\{\wedge^4   \star\}, \{\wedge^*, \{\wedge^3  0, * v\}  \star  vv\}, \{\wedge^*, \{\wedge^3   \wedge^*, \{0, \wedge^* v\}\} 0, \{\wedge  0, *\}\})$   | 0                  |
| 60 | ChilledDomineering("...x", "...", "...", "x.x.")   | $\{\wedge, \{\wedge^* 0\}  \{\wedge^* vv^*\}, \{0, v^* vv^*\}\}$  | 0.5                |
| 61 | ChilledDomineering("...x", "...", "...", "xx.")    | $\{\wedge^3   \{\text{Pow}(v, 2) v, vv^*, \{*, v, +(*, \wedge) v, vv^*\} vv^*, v3\}, \{\wedge^* v4^*, v4^*\}\}$   | $\{1 1, \{1 0\}\}$ |
| 62 | ChilledDomineering("...x", "...", ".x.", "x...")   | + - {\wedge   \wedge  v}  | *                  |



|    |  |  |               |
|----|--|--|---------------|
|    |  | $v vv, \{0, * v, vv^*, \{0, v^* vv, vv^*\} vv^*, v3\}$   |               |
| 12 | ChilledDomineering("....", "...", ".xx.", "...<br>.")  | $\{0  vv, vv^* 0\}$  | -1.5          |
| 13 | ChilledDomineering("....", "...", "x.x.", "...<br>.")  | $\{v, \{0, \{^{\wedge}0\} PowTo(v,2) PowTo(v,2), \{v, v^*, \{v, v^* v3\} vv^*, v3\}, \{v, \{^{\wedge} vv\} v3\}\}$   | -1            |
| 14 | ChilledDomineering("....", "...x", "...", ".x.<br>.")  | $+-(\{^{\wedge}\{^{\wedge} v, \{0, ^{\wedge} v, v^*\}, \{^{\wedge}3 , ^{\wedge}, \{^{\wedge}, ^{\wedge} 0, v^*\}, \{^{\wedge}3 * ^{\wedge}, \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}  \{*, ^{\wedge} 0, v^*\}, \{0, ^{\wedge}, \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}  \{0, v^*, \star v^*, vv\}, \{^{\wedge} ^{\wedge} v\}\}\})$  | 0             |
| 15 | ChilledDomineering("....", "...x", "...", "x..<br>.")  | $\{\{^{\wedge}3 v\}, \{^{\wedge}, \{^{\wedge}, ^{\wedge}3 ^{\wedge}, ^{\wedge}, \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}  \{0, * v\}, \{0, ^{\wedge} v, v^*\}\} v3^*, \{v^*, vv, \{0, v^*, \star v^*, vv\} vv, v3^*\} v4\}$  | $-1^{\wedge}$ |
| 16 | ChilledDomineering("....", "...x", ".x.", "...<br>.")  | $\{\{0, * v\}, \{\{^{\wedge}0\} 0  0, * vv\} v, v^* v3\}, \{\{^{\wedge}, ^{\wedge} ^{\wedge}, ^{\wedge}, +-( * , ^{\wedge}), \{^{\wedge}0\} v, \{+-( * , ^{\wedge}), \{^{\wedge} v^*\} vv^*\} v, \{v v4\}\}$   | -1            |
| 17 | ChilledDomineering("....", "...x", "x...", "...<br>.") | $\{\{^{\wedge} v, \{^{\wedge} v^*, \{^{\wedge} v\} 0\}$  | -1            |
| 18 | ChilledDomineering("....", "...x", "...", "x..<br>.")  | $+-(^{\wedge}, \uparrow +^*, \{^{\wedge}3 ^{\wedge} 0, \{\{^{\wedge} v^*\}, \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\} v^*, \{\star, \{0, ^{\wedge} v\} vv\}\}, \{\{^{\wedge}, ^{\wedge}3 ^{\wedge}, ^{\wedge}, \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}, \{^{\wedge}3 ^{\wedge} 0, *, \{^{\wedge} ^{\wedge} 0, v^*\}, \star\}, \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}  \{^{\wedge}, \{^{\wedge} ^{\wedge} 0, v^*\}, \star\}  \{v vv\}, \{0, v^*, \star v^*, vv\}, \{^{\wedge}, ^{\wedge} ^{\wedge}, +-( * , ^{\wedge}) 0, \{0, v^*, \star v^*, vv\}\}\})$ | 0             |
| 19 | ChilledDomineering("....", ".x.", ".x.", "...<br>.")   | 0  | 0             |
| 20 | ChilledDomineering("...x", "...", "...", "x..<br>.")   | *  | 0             |

4x4 大小的 15 格空格盘面

| Num | Position  | Value   | Atomic Weight |
|-----|---|---|---------------|
| 1   | ChilledDomineering("....", "...", "...", ".<br>..x")    | $+-(\{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}, \{^{\wedge}3^*, \{^{\wedge}3 ^{\wedge}, ^{\wedge}\} 0, ^{\wedge}\}, \{^{\wedge}5 \{0  0, v^*, \star v^*, vv\}, \{0, v^* vv, \{0, v^* vv\}\}\})$   | 0             |
| 2   | ChilledDomineering("....", "...", "...", ".<br>..x")    | $\{\{^{\wedge}, \{^{\wedge}, ^{\wedge}3 ^{\wedge}, \{^{\wedge}, \{^{\wedge} v^*\} vv^*\}, \{^{\wedge} 0, v^*, \{^{\wedge} 0, v^*\}\}, \{^{\wedge}, \{^{\wedge} * ^{\wedge} v^*, \{^{\wedge} v^*\} ^{\wedge}, \star\} ^{\wedge}, \{0, * 0, ^{\wedge} vv, vv^* 0\}\}$   | 1             |
| 3   | ChilledDomineering("....", "...", ".x.", "...<br>....") | $+-(\{^{\wedge}3, \{^{\wedge}4 ^{\wedge}, \{^{\wedge}4^*, ^{\wedge}4 ^{\wedge}, \{^{\wedge}3 ^{\wedge}, ^{\wedge}\}\}  \{^{\wedge}, ^{\wedge} 0, ^{\wedge}, \star\}, \{^{\wedge}, ^{\wedge} 0, \{^{\wedge} 0, v^*\}\}, \{^{\wedge} ^{\wedge} ^{\wedge}, \star\}, \{0 < 2 >   0, * v   \{0, * v\}, \{\{^{\wedge}3 v^*\}, \{^{\wedge}3 v\} vv^*, \{v^* v3\}\}\})$ | *             |

4x4 大小的 16 格空格盤面

| Num | Position  | Value | Atomic Weight |
|-----|---|-------|---------------|
| 1   | ChilledDomineering("....","....","....","....") | 0     | 0             |

