TR－A－0038

パターンの良さ判断に対するシンメトロピー尺度の有効性

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Note: このレポートは、著者川津茂生の、ＡＴＲ視聴覚機構研究所における、研修研究員(1988.4-1988.12)としての研究活動の成果である。

１．Ｈｏｗｅパターンのシンメトロピーを用いた重回帰分析

このレポートは、Ｈｏｗｅパターン（Ｈｏｗｅ＆Ｊｕｎｇ，１９８６）のｇｏｏｄｎｅｓｓ ｊｕｄｇｍｅｎｔｓが、Ｙｏｄｏｇａｗａ（１９８２）の提唱したシンメトロピーでどの程度まで説明できるかを、重回帰分析を用いて検証したものである。シンメトロピーのｖａｌｉｄｉｔｙの検証ともいえる。

Ｈｏｗｅパターンは、５Ｘ５のマトリックスの上にドットを記入したものである。パターンの数は全部で２００ある。それぞれのパターンのドットの数は一定でなく、ドットが１つのものから１１のものまでの１１段階にわかれている。

重回帰分析は、ＳＡＳのｓｔｅｐｗｉｓｅの変数増加法（ｆｏｒｗａｒｄ ｓｅｌｅｃｔｉｏｎ ｐｒｏｃｅｄｕｒｅ）、変数減少法（ｂａｃｋｗａｒｄ ｅｌｉｍｉｎａｔｉｏｎ ｐｒｏｃｅｄｕｒｅ）及び最大R^2改良法（Ｍａｘｉｍｕｎ Ｒ－ｓｑｕａｒｅ ｉｍｐｒｏｖｅｍｅｎｔ）を用いて実行された。

変数増加法は、独立変数をＦ統計量の大きい順に１つずつモデルに取り込んでいく方法である。変数減少法は、反対に、Ｆ統計量の小さい順に変数を除いていく方法である。最大R^2改良法は、R^2が最大となる１変数モデル、それが最大となる２変数モデル、という順に、それぞれのステップで、その前のステップでのモデルとは関係なく、R^2が最大となるｎ変数モデルを捜す方法である。

２．Ａｐｐｅｎｄｉｃｅｓの説明

Ａｐｐｅｎｄｉｘ Ａは２００のＨｏｗｅパターンを表示している。パターンの番号は、それぞれのパターンの右上に記してある。Howeパターンは、淀川英司氏より提供された。

Ａｐｐｅｎｄｉｘ ＢはＨｏｗｅパターンのｇｏｏｄｎｅｓｓ ｊｕｄｇｅｍｅｎｔｓ、ドットの数（Ｎ）、及びシンメトロピーを表示している。一番左の数字は、Ｈｏｗｅパターンの番号である。シンメトロピーは、ＷＳがｗｈｏｌｅ ｓｙｍｍｅｔｒｏｐｙ、ＰＳ２が

４Ｘ４のｗｉｎｄｏｗで計算されたｐａｒｔｉａｌ　ｓｙｍｍｅ－ｔｒｏｐｙ、ＰＳ１が２Ｘ２のｗｉｎｄｏｗで計算されたｐａｒ－ｔｉａｌ　ｓｙｍｍｅｔｒｏｐｙ、そしてＳＤ２とＳＤ１がＰＳ２とＰＳ１のそれぞれの標準偏差である。

Ａｐｐｅｎｄｉｘ Ｃは、すべての変数の基本的統計量（Ｃ－１）、それらの間の相関（Ｃ－２）、そしてｇｏｏｄｎｅｓｓとＮとの間の相関グラフ（Ｃ－３）を表示している。Ｇｏｏｄｎｅｓｓと Ｎ（ドットの数）との間に緩やかな相関（ｒ＝０．３４）があることに注意。

Ａｐｐｅｎｄｉｘ Ｄは、Ｎ（ドットの数）を独立変数として考慮にいれなかった場合のｓｔｅｐｗｉｓｅを用いた重回帰分析の結果である。変数増加法と最大R^2改良法は共に、ＷＳ、ＰＳ２、ＳＤ２、ＳＤ１の順に変数をモデルに取り込んでいる。変数減少法もこれと一致して、（全変数を使ったモデルから）ＰＳ１、ＳＤ１の順に変数を取り除いている。ここで注意すべき点は、ＷＳが一番始めにモデルに入るのはｇｏｏｄｎｅｓｓとの相関が他の変数と比べて飛び抜けて高いということから当然のこととしても、二番目にモデルに入るのが、ｇｏｏｄｎｅｓｓと最も相関の低いＰＳ２であるということである。しかし、これは、ＷＳと他の独立変数との相関をしらべると、どれも低いのであるが、ＰＳ２が最も低く、ＰＳ１、ＳＤ２、ＳＤ１は少なくともｒ＞０．１の相関があるという点から、幾分かは推測できることである。

ＡｐｐｅｎｄｉｘＥは、Ｎを独立変数の一つとみなした場合の重回帰分析の結果である。Ａｐｐｅｎｄｉｘ Ｄのときと同じく、変数増加法と最大R^2改良法は一致した結果を示している。変数の選択の順序は、ＷＳ、Ｎ、ＳＤ１、ＰＳ２、ＳＤ２、ＰＳ１である。変数減少法もこれと一致して、ＰＳ１、ＳＤ２、ＰＳ２の順に排除している。注意すべき点は、Ｎが二番目に重要な変数としてモデルに入っていることである。このことは、Ｎがｇｏｏｄｎｅｓｓと比較的高い相関 を持っていることから納得できる（ｒ＝０．３４）。Ｎ以下の変数の順序

は、Ａｐｐｅｎｄｉｘ　Ｄでの結果とかなり食い違っている。これはＮとそれらの変数との間の複雑な相関関係によるものであろう。

Ａｐｐｅｎｄｉｃｅｓ　Ｄ＆Ｅに共通して注意すべきはＣ（ｐ）統計量であろう。これは、ＳＡＳのマニュアルには、モデルの選択の基準となる統計量だと記されているが、その数値の解釈については明確な説明がみられない。くわしくは、ＤａｎｉｅｌとＷｏｏｄ（１９８０）参照、とあるだけである。

Ａｐｐｅｎｄｉｃｅｓ　Ｆ＆Ｇは、シンメトロピーの計算に使ったマッキントッシュ　パスカル2.1のプログラムである。Ａｐｐｅｎｄｉｘ　Ｆのプログラム ＰＡＴＷＲＩＴＥは、Ｈｏｗｅパターンを０と１で入力すると、それを読み込んでファイルに落とす。Ａｐｐｅｎｄｉｘ　Ｇのプログラム Ｓｙｍｍｅｔｒｏｐｙは、シンメトロピー計算用である。このプログラムは、３Ｘ３から１５Ｘ１５、および３２Ｘ３２のマトリックス　パターンのシンメトロピーの計算ができる。プログラムPATWRITEとSymmetropyは、淀川英司氏が作ったプログラムを拡張したものである。

３．結論

Ｈｏｗｅパターンのｇｏｏｄｎｅｓｓ　ｊｕｄｇｅｍｅｎｔｓは、ＷＳ（ｗｈｏｌｅ　ｓｙｍｍｅｔｒｏｐｙ）だけのモデルでかなり説明できる（Ｒ＝０．８６５）。Ｎを除いたフルモデル（ＷＳ，ＰＳ２　ＰＳ１，ＳＤ２，ＳＤ１を全部入れたモデル）でも、Ｒ＝０．８７までしかＲの値が高くならない。

Ｎを入れたモデルでは、ＷＳの次にＦ値が大きいのがＮである。ＷＳとＮのモデルではＲ＝０．８７３９である。他の変数をすべてモデルに入れてもＲ＝０．８７９である。Ｈｏｗｅパターンのｇｏｏｄｎｅｓｓ　ｊｕｄｇｅｍｅｎｔｓは、ＷＳだけか、あるいはＷＳとＮの２変数モデルでかなりの程度まで説明できる。

Ｎが二番目に重要な変数としてモデルに入ってくることは、Ｈｏｗｅパターンの欠点であろう。これは、Ｈｏｗｅパターンがし意

的に作られているためだと考えられる。シンメトロピーのｖａｌｉｄ-ｉｔｙのよりよい検証のためには、パターンを何らかの方法でシステマティックに作成することが重要である。

References

Daniel, C., & Wood, F. S. (1980). *Fitting equations to data*, Second Edition. New York: John Wiley & Sons.

Howe, E., & Jung, K. (1986). Immediate memory span for two-demensional spatial arrays: Effects of pattern symmetry and goodness. *Acta Psychologica, 61.*

Yodogawa, E. (1982). Symmetropy, an entropy-like measure of visual symmetry. *Perception & Psychophysics, 32*, 230-240.

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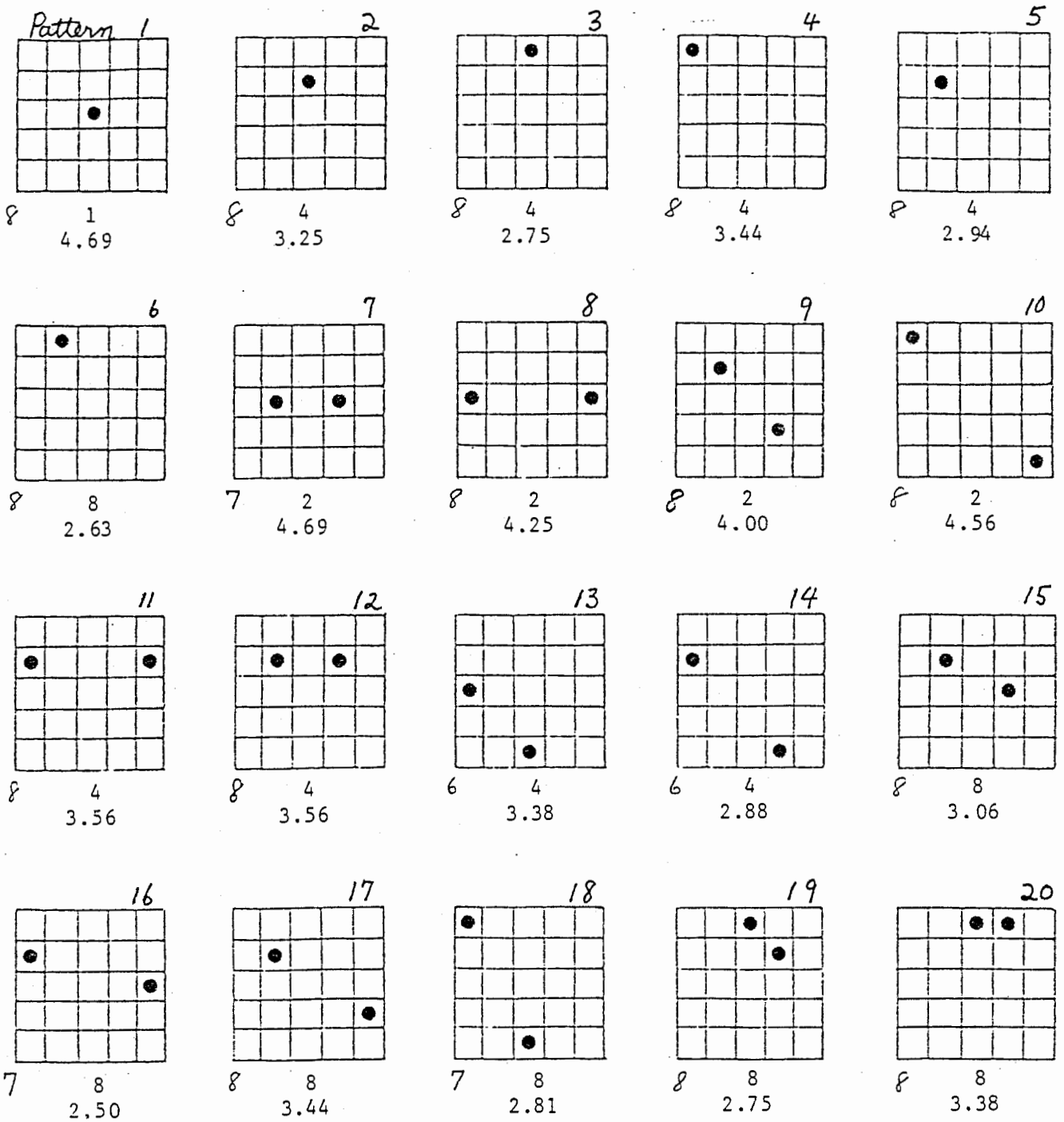

Note

The 10 pages of Figure 1 contain the complete set of novel dot patterns described and used in the paper, Immediate Memory Span for Two-Dimensional Spatial Arrays: Effects of Pattern Symmetry and Goodness, by Edmund Howe and Kenneth Jung, and published in Acta Psychologica, 1986, 61, (1). The symbols 1, 2, 4, 8_H, 8_M, and 8_L centered under each pattern refer to the rotation and reflection (R&R) subset size of the pattern (see tex). The decimal number under each pattern is the empirical judged goodness value.

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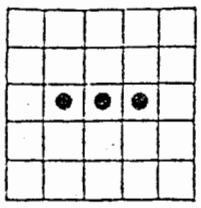

7 2

a
4.69

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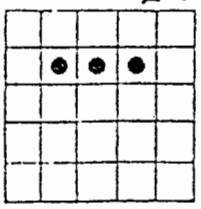
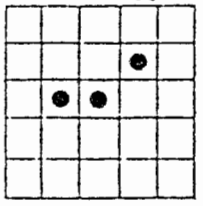


8 4

a
4.31

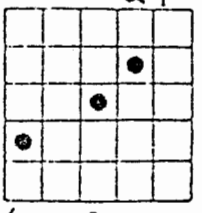
23



8 8_H

a
3.06

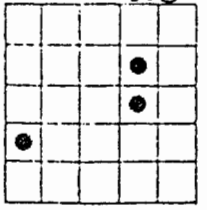
24



6 8_M

a
2.94

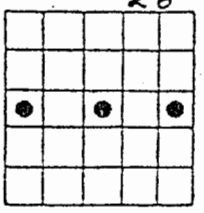
25



6 8_L

a
2.50

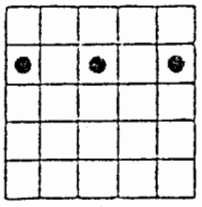
26



8 2

b
4.88

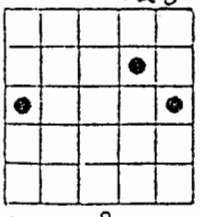
27



7 4

b
4.69

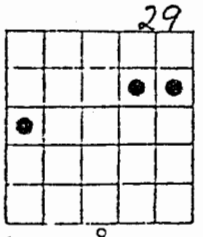
28



6 8_H

b
2.81

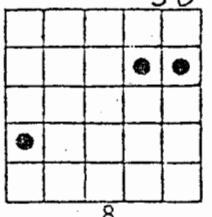
29



6 8_M

b
2.69

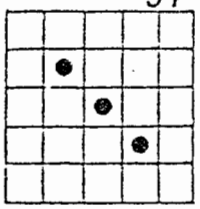
30



7 8_L

b
2.63

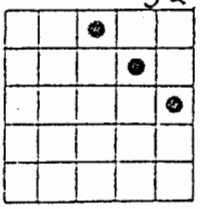
31



8 2

c
5.06

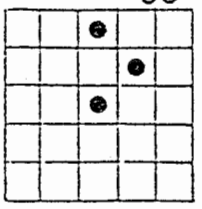
32



8 4

c
4.38

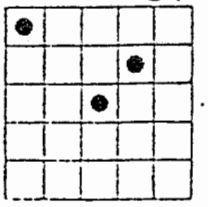
33



7 8_H

c
4.63

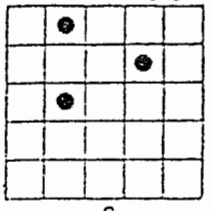
34



6 8_M

c
2.63

35



6 8_L

c
4.31

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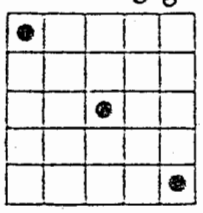
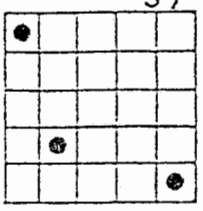


8 2

d
4.94

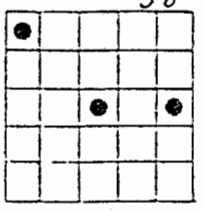
37



6 4

d
2.88

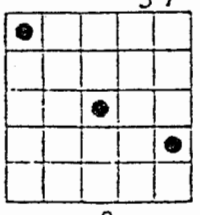
38



5 8_H

d
2.81

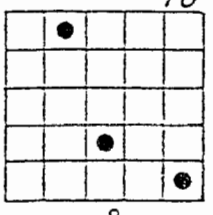
39



7 8_M

d
2.88

40



6 8_L

d
2.75

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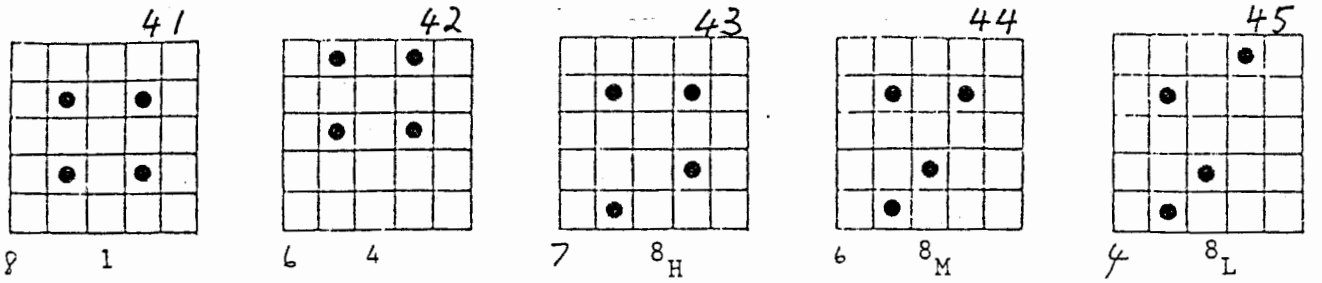

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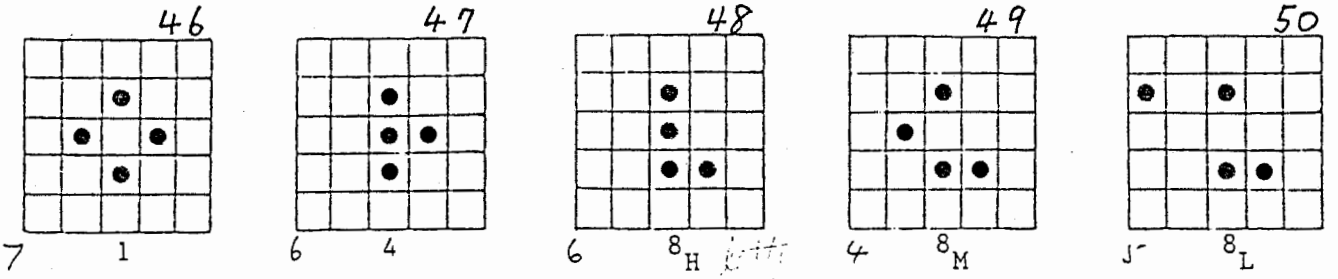

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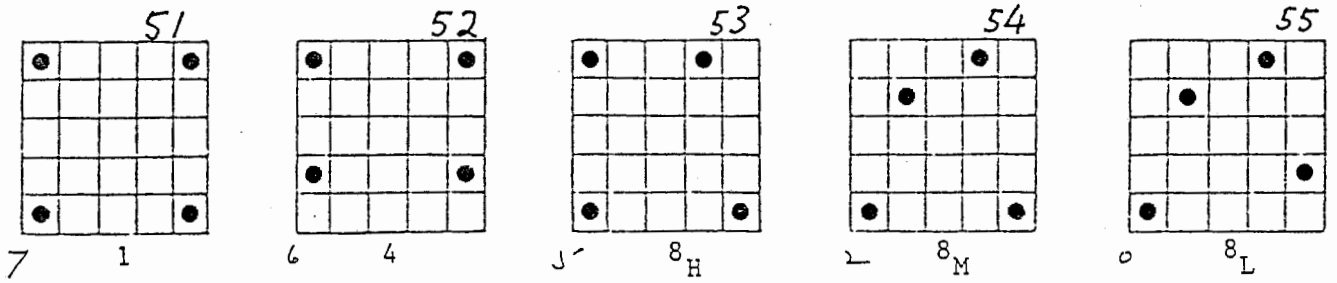

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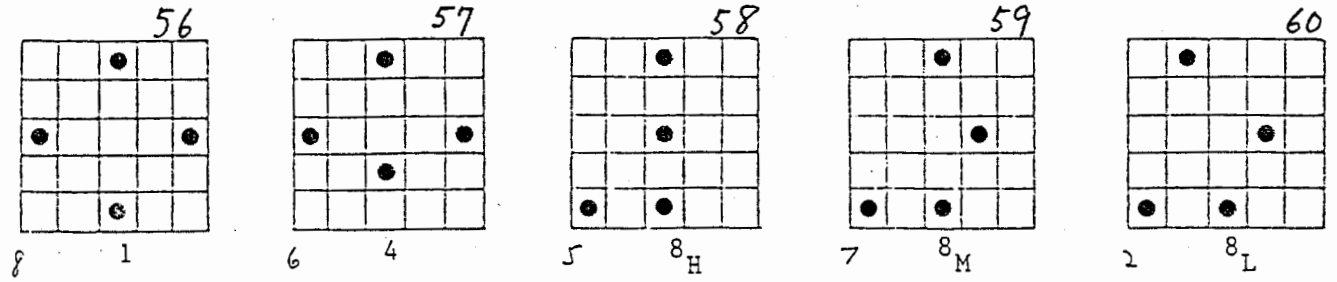

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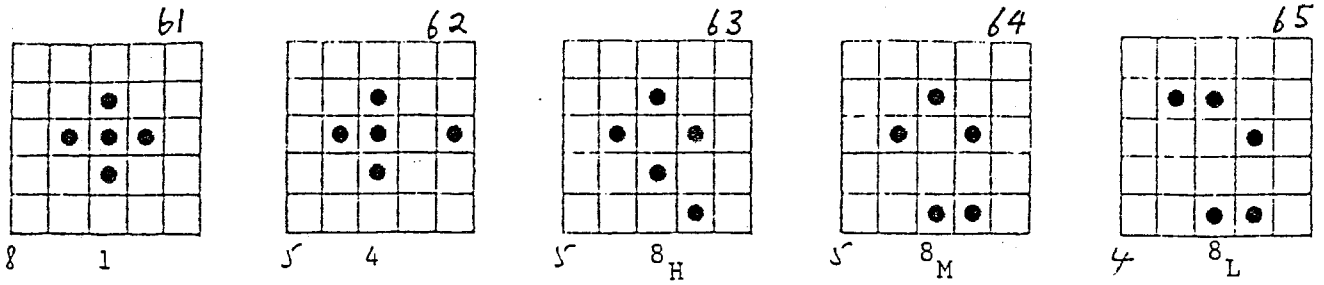

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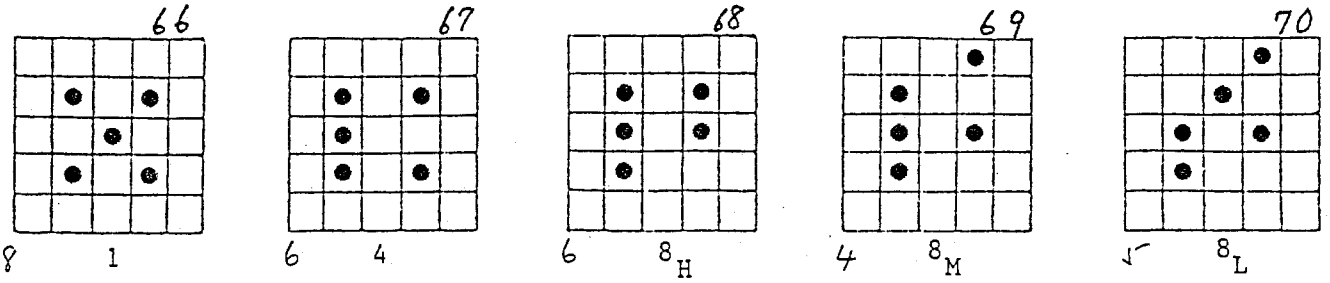
5.50	4.13	3.94	3.50	3.38



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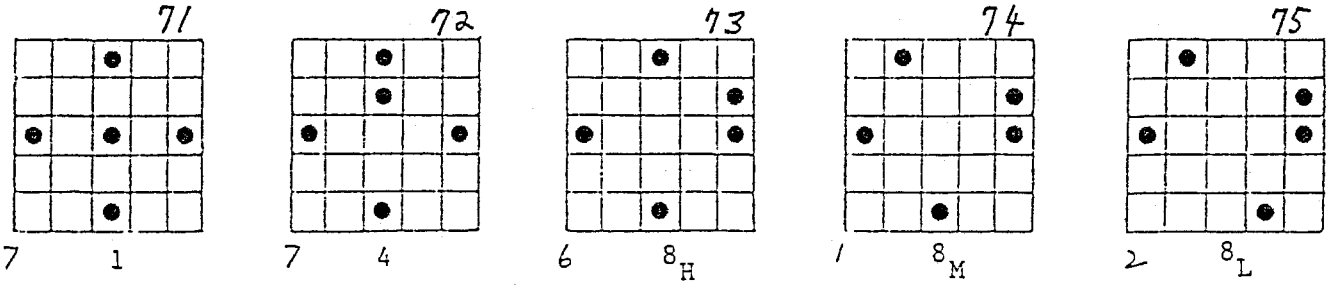
b	b	b	b	b
5.56	4.19	4.50	2.81	3.88



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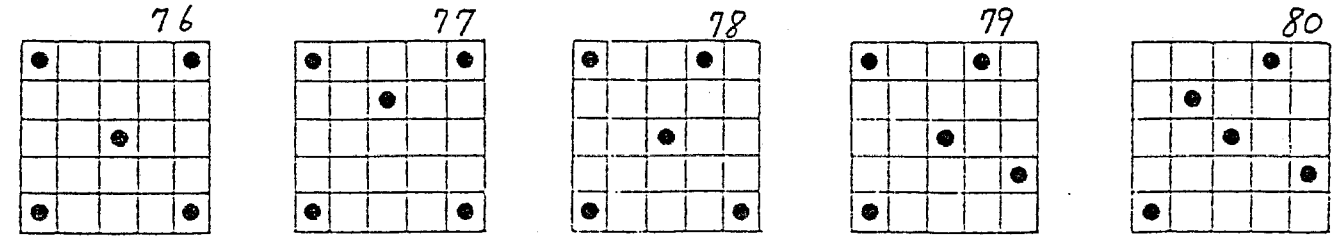

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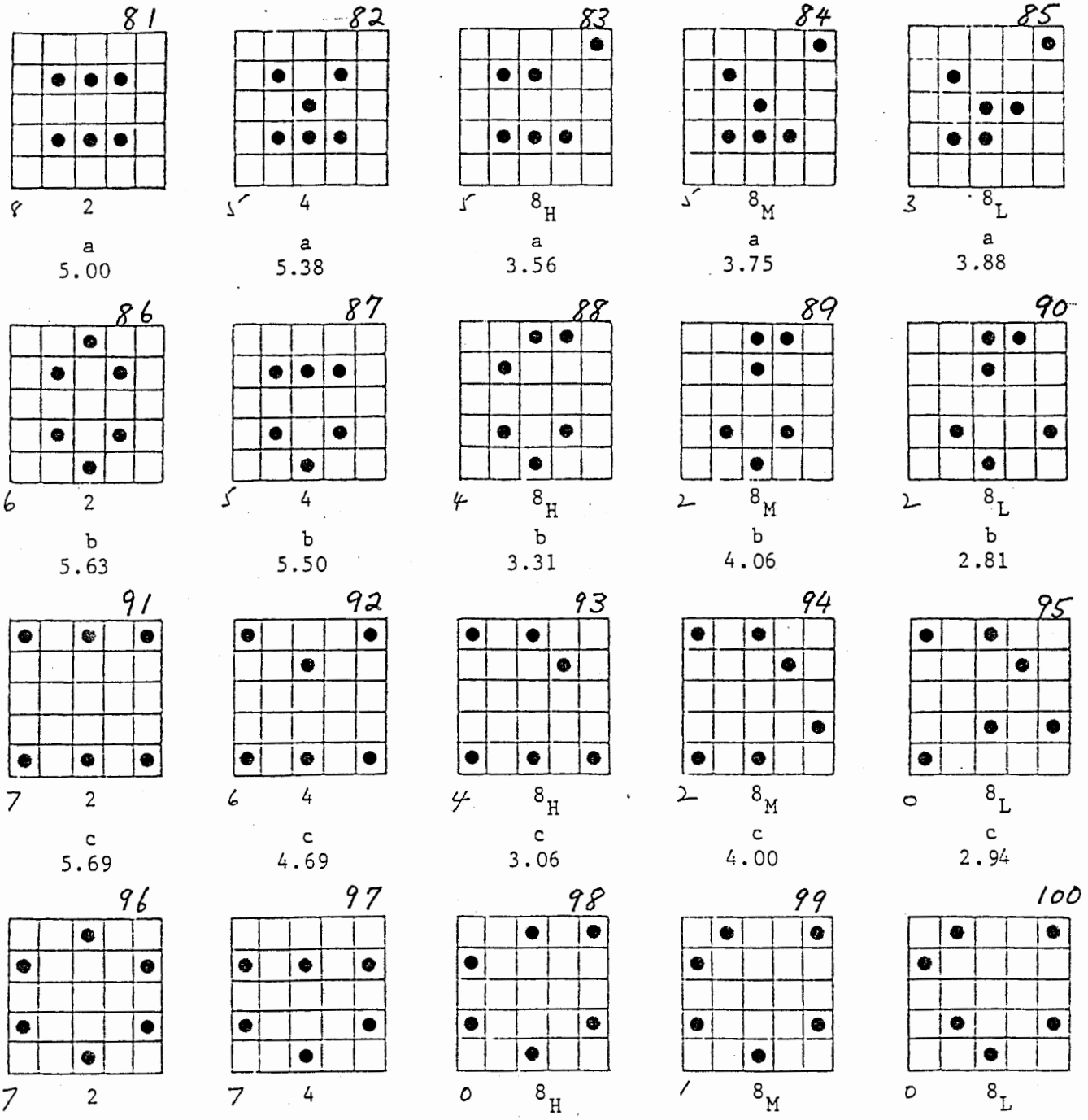
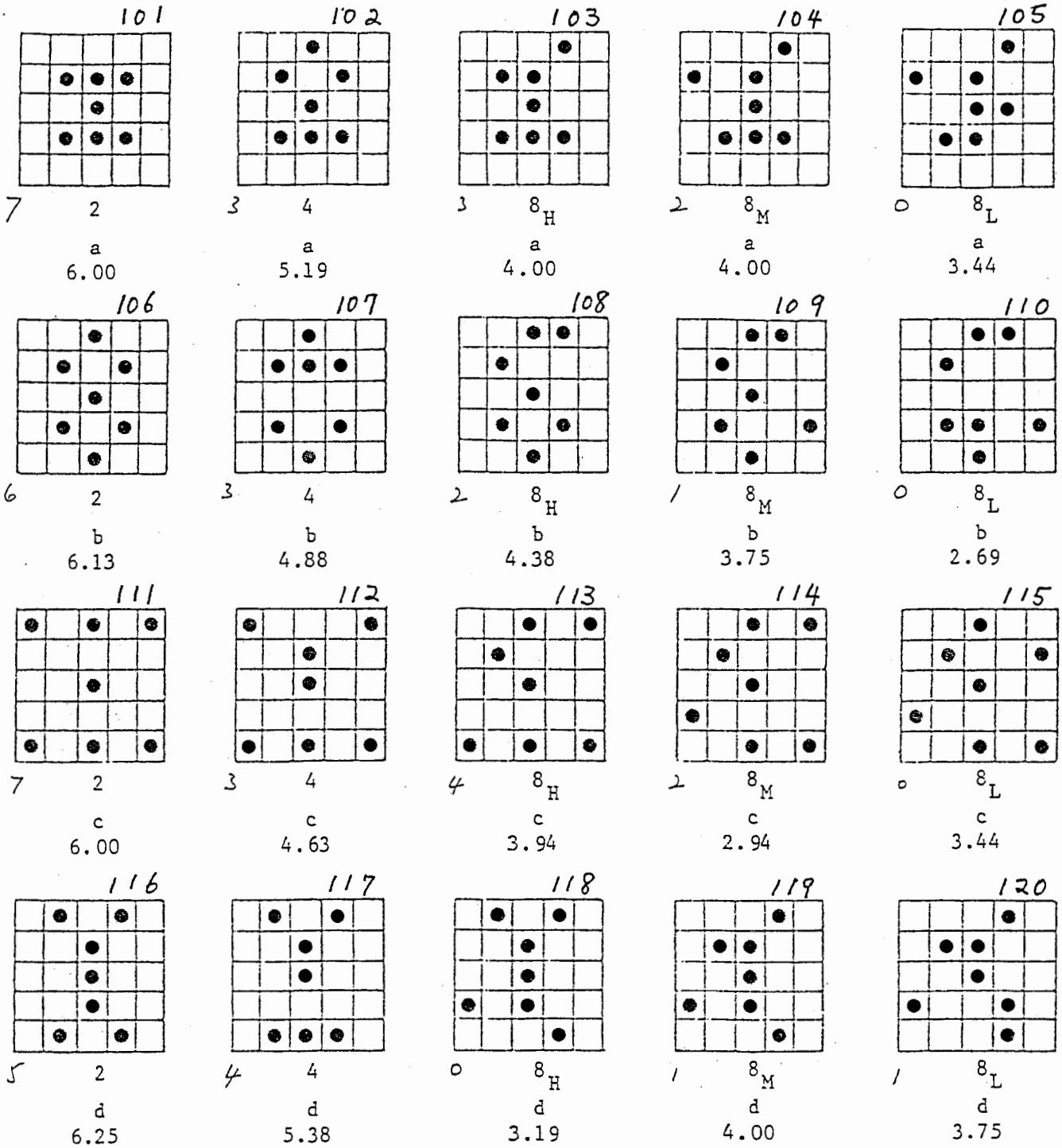
d	d	d	d	d
5.56	3.69	3.38	3.56	2.63

Array Size 6

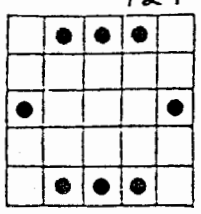

81
8 2
a
5.00
82
5 4
a
5.38
83
5 8H
a
3.56
84
5 8M
a
3.75
85
3 8L
a
3.88
86
6 2
b
5.63
87
5 4
b
5.50
88
4 8H
b
3.31
89
2 8M
b
4.06
90
2 8L
b
2.81
91
7 2
c
5.69
92
6 4
c
4.69
93
4 8H
c
3.06
94
2 8M
c
4.00
95
0 8L
c
2.94
96
7 2
d
5.81
97
7 4
d
5.00
98
0 8H
d
4.00
99
1 8M
d
3.56
100
0 8L
d
3.25

Array Size 7


101
7 2
a
6.00
102
3 4
a
5.19
103
3 8H
a
4.00
104
2 8M
a
4.00
105
0 8L
a
3.44
106
6 2
b
6.13
107
3 4
b
4.88
108
2 8H
b
4.38
109
1 8M
b
3.75
110
0 8L
b
2.69
111
7 2
c
6.00
112
3 4
c
4.63
113
4 8H
c
3.94
114
2 8M
c
2.94
115
0 8L
c
3.44
116
5 2
d
6.25
117
4 4
d
5.38
118
0 8H
d
3.19
119
1 8M
d
4.00
120
1 8L
d
3.75

Array Size 8

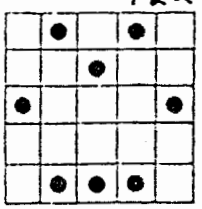
121



8 2

a
5.38

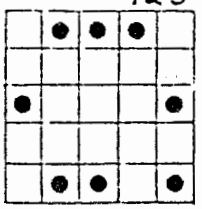
122



3 4

a
5.06

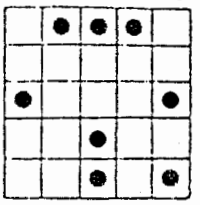
123



1 8_H

a
3.38

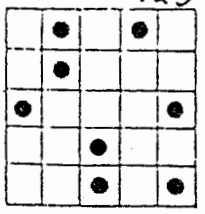
124



2 8_M

a
3.13

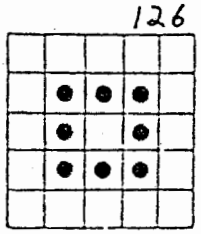
125



0 8_L

a
3.06

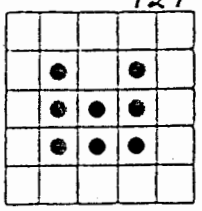
126



6 1

b
5.94

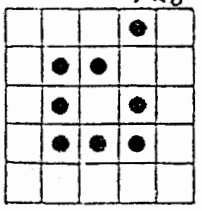
127



4 4

b
5.31

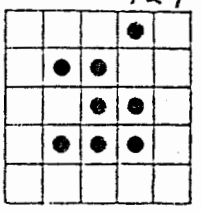
128



4 8_H

b
3.81

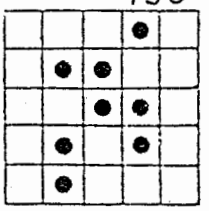
129



1 8_M

b
4.06

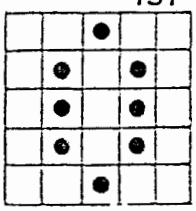
130



1 8_L

b
3.25

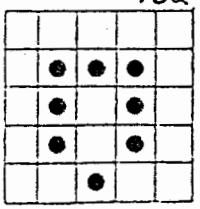
131



6 2

c
6.00

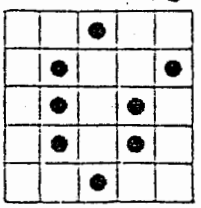
132



6 4

c
5.73

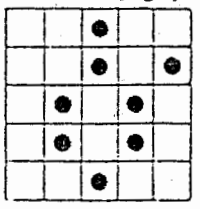
133



2 8_H

c
4.50

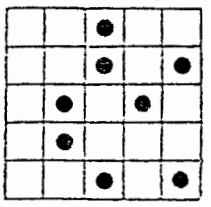
134



2 8_M

c
5.06

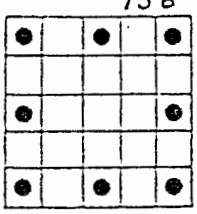
135



1 8_L

c
3.13

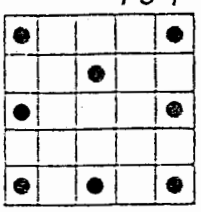
136



5 1

d
6.06

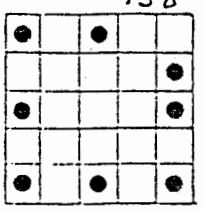
137



6 4

d
4.81

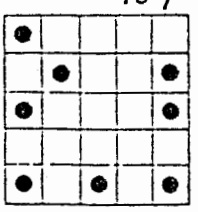
138



3 8_H

d
3.75

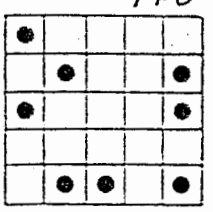
139



0 8_M

d
2.81

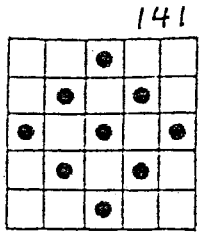
140



0 8_L

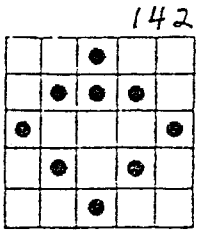
d
3.25

Array Size 9



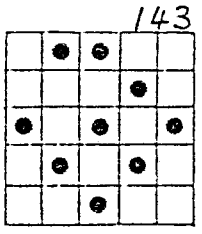
6 1

a
6.44



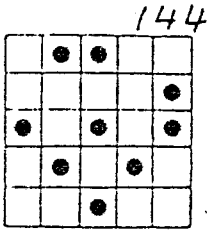
2 4

a
5.69



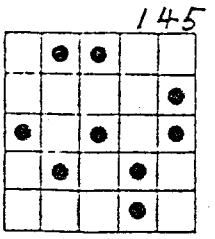
0 8_H

a
4.13



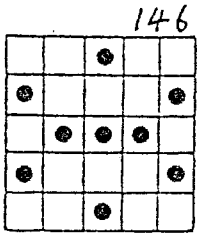
0 8_M

a
3.88



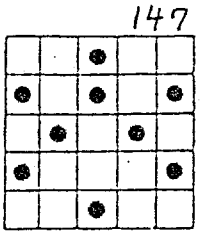
0 8_L

a
2.75



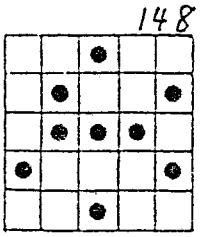
5 2

b
5.69



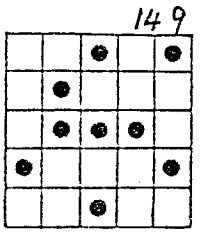
1 4

b
5.06



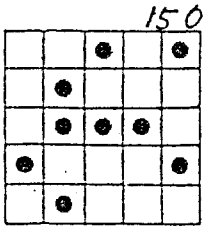
0 8_H

b
3.63



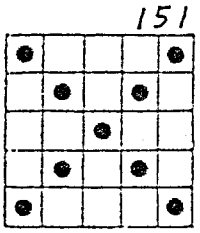
0 8_M

b
2.94



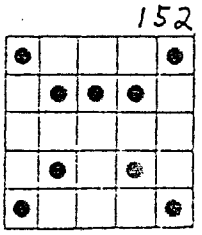
0 8_L

b
3.00



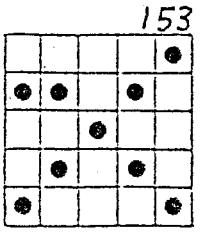
6 1

c
6.06



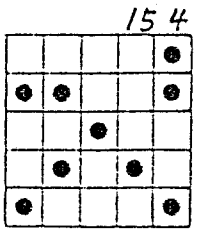
2 4

c
4.81



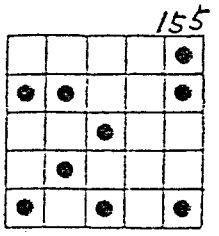
4 8_H

c
5.31



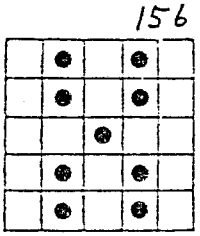
1 8_M

c
4.00



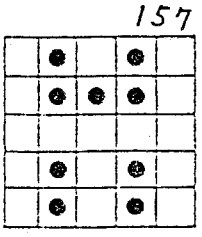
0 8_L

c
3.19



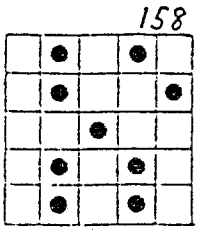
5 2

d
6.38



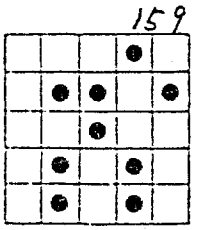
4 4

d
4.88



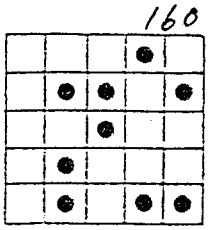
1 8_H

d
4.06



0 8_M

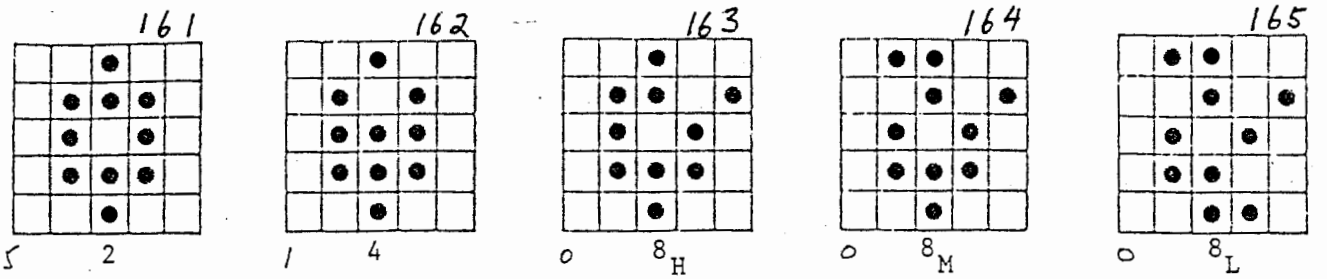
d
3.75



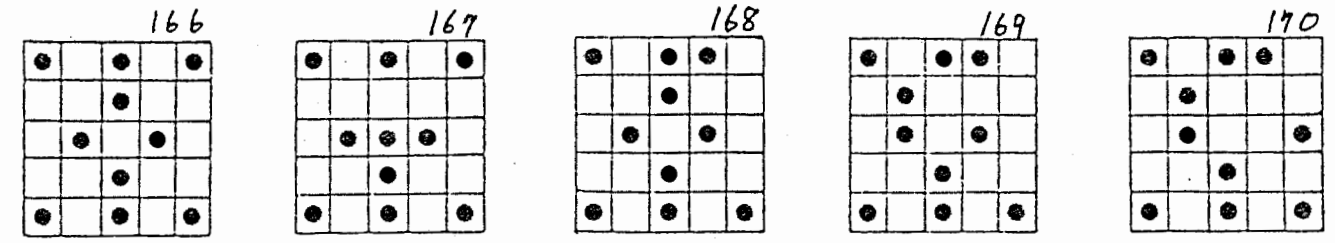
0 8_L

d
3.25

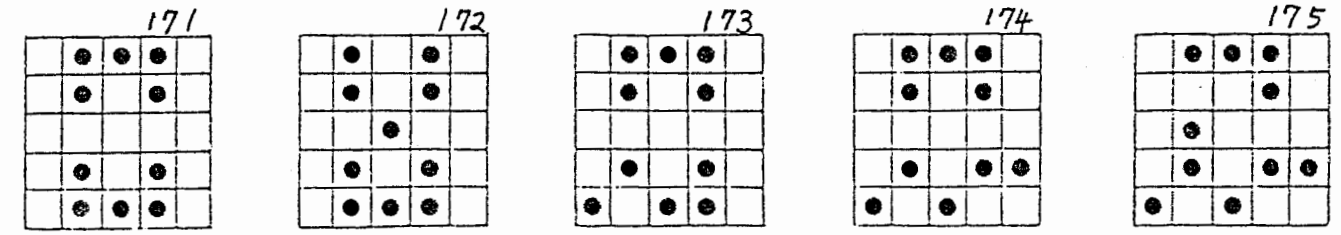
Array Size 10



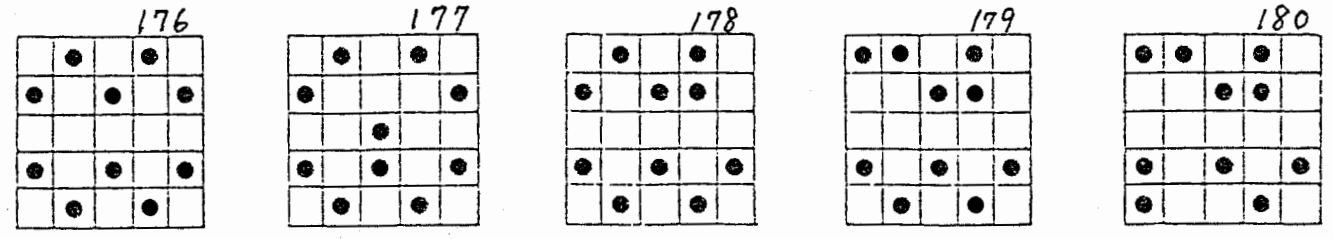
5 2	1 4	0 8_H	0 8_M	0 8_L
a	a	a	a	a
6.13	4.81	3.88	3.56	3.56



2 2	0 4	0 8_H	0 8_M	0 8_L
b	b	b	b	b
5.50	5.25	3.13	3.25	2.88



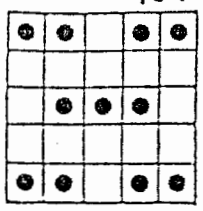
5 2	3 4	2 8_H	1 8_M	0 8_L
c	c	c	c	c
6.13	5.50	3.75	3.69	3.25



3 2	1 4	0 8_H	1 8_M	0 8_L
d	d	d	d	d
6.50	5.88	4.63	4.06	4.13

Array Size 11

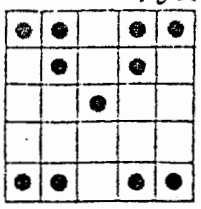
181



6 2

a
5.56

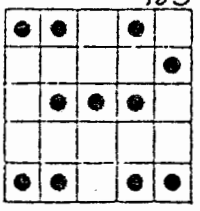
182



0 4

a
5.75

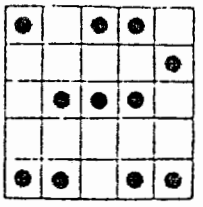
183



0 8_H

a
4.19

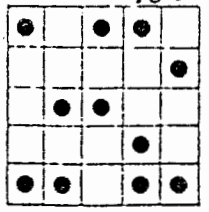
184



0 8_M

a
3.94

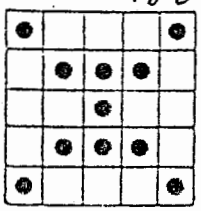
185



0 8_L

a
3.44

186



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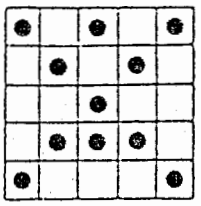
187



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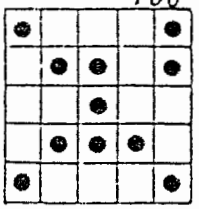

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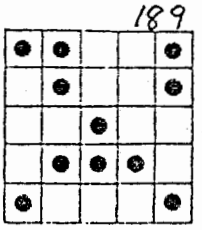

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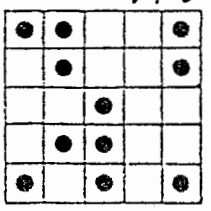
190



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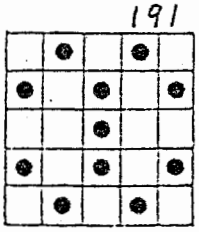

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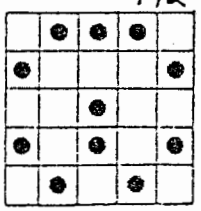
192



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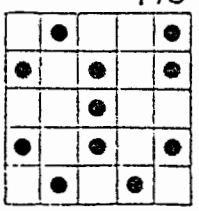
193



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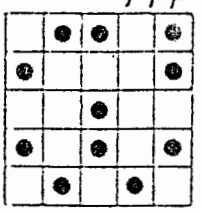

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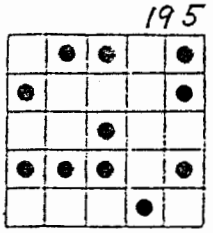

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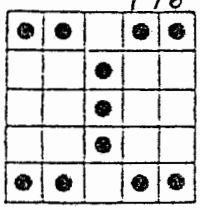

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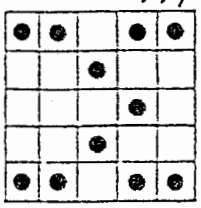

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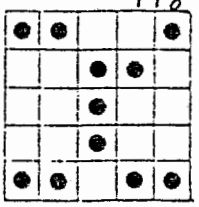

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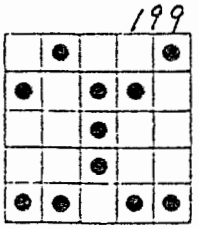

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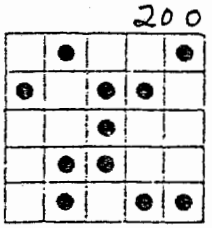
200



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d
3.75

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
1	4.69	1	0.00	1.99	0.40	0.00	0.69
2	3.25	1	1.00	1.99	0.40	0.00	0.69
3	2.75	1	1.00	0.99	0.20	0.99	0.52
4	3.44	1	2.00	0.50	0.10	0.86	0.38
5	2.94	1	2.00	1.99	0.40	0.00	0.69
6	2.63	1	2.00	0.99	0.20	0.99	0.52
7	4.69	2	0.00	1.95	0.79	0.00	0.79
8	4.25	2	0.00	1.99	0.40	0.00	0.69
9	4.00	2	1.00	1.95	0.79	0.00	0.79
10	4.56	2	1.00	0.99	0.20	0.99	0.52
11	3.56	2	1.00	1.99	0.40	0.00	0.69
12	3.56	2	1.00	1.95	0.79	0.00	0.79
13	3.38	2	1.52	1.48	0.40	0.86	0.69
14	2.88	2	2.00	1.24	0.40	0.83	0.69
15	3.06	2	1.82	1.95	0.79	0.00	0.79
16	2.50	2	1.82	1.99	0.40	0.00	0.69
17	3.44	2	2.00	1.97	0.59	0.02	0.77
18	2.81	2	1.82	1.49	0.30	0.86	0.62
19	2.75	2	1.82	1.97	0.40	0.02	0.69

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
20	3.38	2	1.82	0.73	0.20	0.81	0.52
21	4.69	3	0.00	1.68	0.40	0.00	0.69
22	4.31	3	1.00	1.68	0.40	0.00	0.69
23	3.06	3	1.59	1.73	0.59	0.07	0.77
24	2.94	3	1.83	1.66	0.79	0.39	0.79
25	2.50	3	1.93	1.58	0.59	0.36	0.77
26	4.88	3	0.00	1.95	0.79	0.00	0.79
27	4.69	3	1.00	1.95	0.79	0.00	0.79
28	2.81	3	1.25	1.71	0.59	0.42	0.77
29	2.69	3	1.93	1.71	0.40	0.42	0.69
30	2.63	3	1.67	1.95	0.40	0.00	0.69
31	5.06	3	0.93	1.77	0.79	0.09	0.79
32	4.38	3	1.85	1.94	0.40	0.05	0.69
33	4.63	3	1.59	1.86	0.59	0.11	0.77
34	2.63	3	1.83	1.68	0.69	0.41	0.79
35	4.31	3	1.93	1.90	0.99	0.05	0.77
36	4.94	3	0.93	1.97	0.59	0.02	0.77
37	2.88	3	1.67	1.97	0.59	0.02	0.77
38	2.81	3	1.59	1.96	0.69	0.02	0.79

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
39	2.88	3	1.83	1.96	0.69	0.02	0.79
40	2.75	3	1.93	1.72	0.69	0.42	0.79
41	4.81	4	0.00	1.58	1.58	0.00	0.00
42	4.69	4	0.84	1.77	1.19	0.18	0.69
43	3.69	4	1.60	1.82	1.39	0.03	0.52
44	2.75	4	1.56	1.82	1.19	0.03	0.69
45	3.38	4	1.78	1.73	0.99	0.07	0.77
46	5.50	4	0.00	1.79	0.79	0.00	0.79
47	5.25	4	0.57	1.79	0.79	0.00	0.79
48	4.88	4	1.04	1.74	0.59	0.09	0.77
49	2.63	4	1.38	1.79	0.79	0.00	0.79
50	2.56	4	1.60	1.63	0.99	0.05	0.77
51	5.19	4	0.00	1.99	0.40	0.00	0.69
52	4.31	4	1.00	1.49	0.59	0.50	0.77
53	3.47	4	1.60	1.74	0.50	0.44	0.73
54	2.38	4	1.83	1.71	0.79	0.42	0.79
55	2.38	4	1.99	1.93	0.89	0.04	0.79
56	5.31	4	0.00	1.95	0.79	0.00	0.79
57	4.06	4	0.84	1.82	0.99	0.13	0.77

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
58	3.81	4	1.04	1.93	0.89	0.04	0.79
59	3.06	4	1.38	1.93	0.89	0.04	0.79
60	2.50	4	1.93	1.93	0.89	0.04	0.79
61	5.50	5	0.00	1.97	1.19	0.00	0.69
62	4.13	5	0.75	1.80	0.99	0.00	0.77
63	3.94	5	0.90	1.67	0.79	0.15	0.79
64	3.50	5	1.39	1.75	0.99	0.12	0.77
65	3.38	5	1.88	1.83	0.79	0.14	0.79
66	5.56	5	0.00	1.68	1.19	0.00	0.69
67	4.19	5	0.50	1.68	1.19	0.00	0.69
68	4.50	5	0.90	1.55	0.79	0.13	0.79
69	2.81	5	1.39	1.74	0.99	0.05	0.77
70	3.88	5	1.64	1.74	0.79	0.05	0.79
71	6.19	5	0.00	1.85	1.19	0.00	0.69
72	4.56	5	0.50	1.77	0.79	0.09	0.79
73	2.63	5	0.90	1.86	0.79	0.11	0.79
74	2.50	5	1.64	1.86	0.79	0.11	0.79
75	2.44	5	1.39	1.86	0.79	0.11	0.79
76	5.56	5	0.00	1.95	0.79	0.00	0.79

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
77	3.69	5	0.50	1.95	0.79	0.00	0.79
78	3.38	5	1.43	1.88	0.89	0.12	0.79
79	3.56	5	1.74	1.86	0.99	0.11	0.77
80	2.63	5	1.96	1.74	1.09	0.12	0.73
81	5.00	6	0.00	1.43	0.79	0.00	0.79
82	5.38	6	0.44	1.85	1.19	0.14	0.69
83	3.56	6	1.29	1.55	0.89	0.14	0.79
84	3.75	6	1.50	1.86	1.09	0.11	0.73
85	3.88	6	1.63	1.86	1.09	0.11	0.73
86	5.63	6	0.00	1.68	1.19	0.00	0.69
87	5.50	6	0.69	1.84	0.99	0.15	0.77
88	3.31	6	1.29	1.79	0.99	0.14	0.77
89	4.06	6	1.39	1.84	0.99	0.07	0.77
90	2.81	6	1.78	1.62	0.99	0.14	0.77
91	5.69	6	0.00	1.95	0.79	0.00	0.79
92	4.69	6	0.69	1.82	0.99	0.13	0.77
93	3.06	6	1.29	1.79	0.89	0.11	0.79
94	4.00	6	1.63	1.77	0.99	0.09	0.77
95	2.94	6	1.87	1.78	1.19	0.06	0.69

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
96	5.81	6	0.00	1.85	1.19	0.00	0.69
97	5.00	6	0.69	1.82	1.39	0.03	0.52
98	4.00	6	1.29	1.84	1.09	0.10	0.73
99	3.56	6	1.78	1.76	0.89	0.22	0.79
100	3.25	6	1.93	1.31	0.89	0.76	0.79
101	6.00	7	0.00	1.87	1.19	0.00	0.69
102	5.19	7	0.64	1.93	0.99	0.06	0.77
103	4.00	7	1.18	1.88	0.99	0.07	0.77
104	4.00	7	1.52	1.81	0.99	0.22	0.77
105	3.44	7	1.67	1.89	1.19	0.09	0.69
106	6.13	7	0.00	1.43	0.79	0.00	0.79
107	4.88	7	0.40	1.85	1.19	0.14	0.69
108	4.38	7	1.18	1.64	0.79	0.23	0.79
109	3.75	7	1.52	1.36	0.99	0.28	0.77
110	2.69	7	1.70	1.77	0.99	0.15	0.77
111	6.00	7	0.00	1.85	1.19	0.00	0.69
112	4.63	7	0.64	1.74	0.99	0.05	0.77
113	3.94	7	1.18	1.71	1.09	0.09	0.73
114	2.94	7	1.52	1.74	1.19	0.09	0.69

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
115	3.44	7	1.52	1.84	1.29	0.08	0.62
116	6.25	7	0.00	1.80	0.40	0.00	0.69
117	5.38	7	0.64	1.88	0.59	0.09	0.77
118	3.19	7	1.18	1.63	0.59	0.13	0.77
119	4.00	7	1.52	1.78	0.79	0.05	0.79
120	3.75	7	1.81	1.46	0.79	0.08	0.79
121	5.38	8	0.00	1.79	0.79	0.00	0.79
122	5.06	8	0.59	1.78	0.99	0.19	0.77
123	3.38	8	1.09	1.77	0.89	0.05	0.79
124	3.13	8	1.22	1.84	0.89	0.16	0.79
125	3.06	8	1.57	1.64	0.89	0.14	0.79
126	5.94	8	0.00	1.81	0.79	0.00	0.79
127	5.31	8	0.37	1.81	0.79	0.00	0.79
128	3.81	8	1.09	1.83	0.79	0.02	0.79
129	4.06	8	1.29	1.88	0.99	0.07	0.77
130	3.25	8	1.57	1.86	0.99	0.02	0.77
131	6.00	8	0.00	1.45	0.40	0.00	0.69
132	5.73	8	0.59	1.71	0.59	0.16	0.77
133	4.50	8	1.09	1.62	0.59	0.18	0.77

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
134	5.06	8	1.22	1.01	0.40	0.26	0.69
135	3.13	8	1.57	1.30	0.69	0.21	0.79
136	6.06	8	0.00	1.85	1.19	0.00	0.69
137	4.81	8	0.59	1.82	1.39	0.03	0.52
138	3.75	8	1.09	1.80	1.09	0.07	0.73
139	2.81	8	1.57	1.75	0.89	0.22	0.79
140	3.25	8	1.80	1.66	0.79	0.19	0.79
141	6.44	9	0.00	0.94	0.40	0.00	0.69
142	5.69	9	0.35	1.66	0.79	0.21	0.79
143	4.13	9	1.02	1.37	0.59	0.41	0.77
144	3.88	9	1.35	1.57	0.79	0.24	0.79
145	2.75	9	1.53	1.57	0.79	0.24	0.79
146	5.69	9	0.00	1.71	0.79	0.00	0.79
147	5.06	9	0.35	1.57	0.79	0.14	0.79
148	3.63	9	1.02	1.69	0.79	0.24	0.79
149	2.94	9	1.35	1.65	0.89	0.22	0.79
150	3.00	9	1.66	1.85	0.69	0.23	0.79
151	6.06	9	0.00	1.43	0.79	0.00	0.79
152	4.81	9	0.35	1.71	0.79	0.00	0.79

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
153	5.31	9	1.02	1.61	0.69	0.19	0.79
154	4.00	9	1.35	1.73	0.69	0.06	0.79
155	3.19	9	1.53	1.76	0.69	0.19	0.79
156	6.38	9	0.00	1.45	0.40	0.00	0.69
157	4.88	9	0.35	1.66	0.79	0.21	0.79
158	4.06	9	1.02	1.62	0.59	0.18	0.77
159	3.75	9	1.49	1.68	0.59	0.18	0.77
160	3.25	9	1.73	1.83	0.69	0.09	0.79
161	6.13	10	0.00	1.87	1.19	0.00	0.69
162	4.81	10	0.32	1.85	0.79	0.02	0.79
163	3.88	10	0.96	1.78	0.99	0.20	0.77
164	3.56	10	1.28	1.57	0.99	0.14	0.77
165	3.56	10	1.28	1.55	0.99	0.34	0.77
166	5.50	10	0.00	1.71	0.79	0.00	0.79
167	5.25	10	0.32	1.85	1.19	0.14	0.69
168	3.13	10	0.96	1.76	0.89	0.05	0.79
169	3.25	10	1.41	1.53	0.69	0.17	0.79
170	2.88	10	1.66	1.55	0.69	0.12	0.79
171	6.13	10	0.00	1.87	1.19	0.00	0.69

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
172	5.50	10	0.32	1.63	0.59	0.18	0.77
173	3.75	10	0.96	1.90	1.09	0.05	0.73
174	3.69	10	1.28	1.75	0.89	0.21	0.79
175	3.25	10	1.66	1.85	0.69	0.10	0.79
176	6.50	10	0.00	1.43	0.79	0.00	0.79
177	5.88	10	0.32	1.57	0.79	0.14	0.79
178	4.63	10	0.96	1.69	0.79	0.24	0.79
179	4.06	10	1.28	1.76	0.69	0.20	0.79
180	4.13	10	1.58	1.82	0.79	0.22	0.79
181	5.56	11	0.00	1.43	0.79	0.00	0.79
182	5.75	11	0.50	1.77	0.79	0.06	0.79
183	4.19	11	0.91	1.61	0.69	0.19	0.79
184	3.94	11	1.35	1.54	0.69	0.19	0.79
185	3.44	11	1.67	1.74	0.89	0.18	0.79
186	6.31	11	0.00	1.81	0.79	0.00	0.79
187	5.44	11	0.50	1.71	0.59	0.16	0.77
188	3.88	11	0.91	1.80	0.79	0.18	0.79
189	3.38	11	1.35	1.73	0.79	0.21	0.79
190	3.38	11	1.52	1.85	0.79	0.02	0.79

OBS	GOODNESS	N	WS	PS2	PS1	SD2	SD1
191	6.00	11	0.00	1.45	0.40	0.00	0.69
192	5.63	11	0.50	1.79	0.59	0.08	0.77
193	4.19	11	0.91	1.62	0.50	0.18	0.73
194	4.00	11	1.22	1.82	0.69	0.12	0.79
195	3.19	11	1.52	1.81	0.69	0.07	0.79
196	6.56	11	0.00	1.99	0.00	0.00	0.00
197	5.38	11	0.31	1.58	0.40	0.12	0.69
198	5.31	11	0.91	1.80	0.20	0.05	0.52
199	4.06	11	1.44	1.79	0.30	0.18	0.62
200	3.75	11	1.52	1.83	0.59	0.03	0.77

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
GOODNESS	200	4.1409000	1.1127977	828.1800	2.3800000	6.560000
N	200	6.4700000	2.9312216	1294.0000	1.0000000	11.000000
WS	200	1.0333000	0.6555408	206.6600	0.0000000	2.000000
PS2	200	1.7248000	0.2262807	344.9600	0.5000000	1.990000
PS1	200	0.7866000	0.2712996	157.3200	0.0000000	1.580000
SD2	200	0.1377500	0.1947178	27.5500	0.0000000	0.990000
SD1	200	0.7389000	0.1008695	147.7800	0.0000000	0.790000

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER H0:RHO=0 / N = 200

	GOODNESS	N	WS	PS2	PS1	SD2	SD1
GOODNESS	1.00000	0.34206	-0.86553	-0.01196	0.05522	-0.33719	-0.14798
	0.0000	0.0001	0.0001	0.8666	0.4374	0.0001	0.0365
N	0.34206	1.00000	-0.26039	-0.05433	0.14470	-0.20970	0.15523
	0.0001	0.0000	0.0002	0.4448	0.0409	0.0029	0.0282
WS	-0.86553	-0.26039	1.00000	-0.06819	-0.10197	0.39359	0.12625
	0.0001	0.0002	0.0000	0.3374	0.1508	0.0001	0.0749
PS2	-0.01196	-0.05433	-0.06819	1.00000	0.33994	-0.66624	0.22438
	0.8666	0.4448	0.3374	0.0000	0.0001	0.0001	0.0014
PS1	0.05522	0.14470	-0.10197	0.33994	1.00000	-0.37063	0.11441
	0.4374	0.0409	0.1508	0.0001	0.0000	0.0001	0.1067
SD2	-0.33719	-0.20970	0.39359	-0.66624	-0.37063	1.00000	-0.18994
	0.0001	0.0029	0.0001	0.0001	0.0001	0.0000	0.0071
SD1	-0.14798	0.15523	0.12625	0.22438	0.11441	-0.18994	1.00000
	0.0365	0.0282	0.0749	0.0014	0.1067	0.0071	0.0000

PLOT OF GOODNESS*N LEGEND: A = 1 OBS, B = 2 OBS, ETC.

```
GOODNESS |                                                   A         B   A   B
6        +                           A   A   C   C   A   C   A
         |                       A   C   C       A   B   B   D
         |                   A   C       C   B   D   B   A   B
         |   A   A   E   C       A   B   A   B   B
         |       B   C   A   B       A   A
4        +       A       B   D   D   D   B   D   C   F
         |   A   C       B   C   C   D   A   B   D   B
         |   A   C   A   B   B   C   A   F   C   C   C
         |   C   C   I   B   C   B   B   A   B   A
         |       A   A   D   B
2        +
         ---+---+---+---+---+---+---+---+---+---+---+
            1   2   3   4   5   6   7   8   9  10  11

                                N
```

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 1 VARIABLE WS ENTERED R SQUARE = 0.74914895 R= 0.865
C(P) = 6.60138022

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	184.60935753	184.60935753	591.31	0.0001
ERROR	198	61.81608047	0.31220243		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.65909306				
WS	-1.46926648	0.06042155	184.60935753	591.31	0.0001

BOUNDS ON CONDITION NUMBER: 1, 1

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 2 VARIABLE PS2 ENTERED R SQUARE = 0.75420995 R=0.868
C(P) = 4.51382896

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	185.85651783	92.92825892	302.25	0.0001
ERROR	197	60.56892017	0.30745645		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.27245807				
WS	-1.47752043	0.06010043	185.82129712	604.38	0.0001
PS2	-0.35067034	0.17411240	1.24716030	4.06	0.0454

BOUNDS ON CONDITION NUMBER: 1.004671, 4.018686

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 3 VARIABLE SD2 ENTERED R SQUARE = 0.75829472 R= 0.8708
C(P) = 3.21474511

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	186.86310738	62.28770246	204.97	0.0001
ERROR	196	59.56233062	0.30388944		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.81770782				
WS	-1.41993850	0.06761035	134.03813334	441.08	0.0001
PS2	-0.65702844	0.24145049	2.25023451	7.40	0.0071
SD2	-0.55421209	0.30451423	1.00658955	3.31	0.0703

BOUNDS ON CONDITION NUMBER: 2.30231, 16.63024

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 4 VARIABLE SD1 ENTERED R SQUARE = 0.75933769 R = 0.8714
C(P) = 4.37238138

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	187.12012253	46.78003063	153.82	0.0001
ERROR	195	59.30531547	0.30412982		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	7.05732108				
WS	-1.40760857	0.06895412	126.73669392	416.72	0.0001
PS2	-0.64021741	0.24223722	2.12438012	6.99	0.0089
SD2	-0.59426528	0.30773464	1.13414074	3.73	0.0549
SD1	-0.37330101	0.40607785	0.25701515	0.85	0.3591

BOUNDS ON CONDITION NUMBER: 2.349406, 27.00048

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

NO OTHER VARIABLES MET THE 0.5000 SIGNIFICANCE LEVEL FOR ENTRY INTO THE MODEL.

SUMMARY OF FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP	VARIABLE ENTERED	NUMBER IN	PARTIAL R**2	MODEL R**2	C(P)	F	PROB>F
1	WS	1	0.7491	0.7491	6.60138	591.3130	0.0001
2	PS2	2	0.0051	0.7542	4.51383	4.0564	0.0454
3	SD2	3	0.0041	0.7583	3.21475	3.3124	0.0703
4	SD1	4	0.0010	0.7593	4.37238	0.8451	0.3591

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 0 ALL VARIABLES ENTERED R SQUARE = 0.75979875 R= 0.87166
C(P) = 6.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	5	187.23374050	37.44674810	122.73	0.0001
ERROR	194	59.19169750	0.30511184		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	7.10029135				
WS	-1.40726024	0.06906771	126.66532480	415.14	0.0001
PS2	-0.62192761	0.24447220	1.97460293	6.47	0.0117
PS1	-0.09574329	0.15689690	0.11361797	0.37	0.5424
SD2	-0.62930674	0.31353442	1.22917409	4.03	0.0461
SD1	-0.36617935	0.40690032	0.24709883	0.81	0.3693

BOUNDS ON CONDITION NUMBER: 2.430948, 40.22197

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 1 VARIABLE PS1 REMOVED R SQUARE = 0.75933769 R= 0.8714
C(P) = 4.37238138

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	187.12012253	46.78003063	153.82	0.0001
ERROR	195	59.30531547	0.30412982		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	7.05732108				
WS	-1.40760857	0.06895412	126.73669392	416.72	0.0001
PS2	-0.64021741	0.24223722	2.12438012	6.99	0.0089
SD2	-0.59426528	0.30773464	1.13414074	3.73	0.0549
SD1	-0.37330101	0.40607785	0.25701515	0.85	0.3591

BOUNDS ON CONDITION NUMBER: 2.349406, 27.00048

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 2 VARIABLE SD1 REMOVED R SQUARE = 0.75829472 R= 0.8708
C(P) = 3.21474511

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	186.86310738	62.28770246	204.97	0.0001
ERROR	196	59.56233062	0.30388944		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.81770782				
WS	-1.41993850	0.06761035	134.03813334	441.08	0.0001
PS2	-0.65702844	0.24145049	2.25023451	7.40	0.0071
SD2	-0.55421209	0.30451423	1.00658955	3.31	0.0703

BOUNDS ON CONDITION NUMBER: 2.30231, 16.63024

ALL VARIABLES IN THE MODEL ARE SIGNIFICANT AT THE 0.1000 LEVEL.

SUMMARY OF BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP	VARIABLE REMOVED	NUMBER IN	PARTIAL R**2	MODEL R**2	C(P)	F	PROB>F
1	PS1	4	0.0005	0.7593	4.37238	0.3724	0.5424
2	SD1	3	0.0010	0.7583	3.21475	0.8451	0.3591

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 1 VARIABLE WS ENTERED R SQUARE = 0.74914895 R= 0.8655
C(P) = 6.60138022

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	184.60935753	184.60935753	591.31	0.0001
ERROR	198	61.81608047	0.31220243		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.65909306				
WS	-1.46926648	0.06042155	184.60935753	591.31	0.0001

BOUNDS ON CONDITION NUMBER: 1, 1

THE ABOVE MODEL IS THE BEST 1 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 2 VARIABLE PS2 ENTERED R SQUARE = 0.75420995 R= 0.86845
C(P) = 4.51382896

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	185.85651783	92.92825892	302.25	0.0001
ERROR	197	60.56892017	0.30745645		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.27245807				
WS	-1.47752043	0.06010043	185.82129712	604.38	0.0001
PS2	-0.35067034	0.17411240	1.24716030	4.06	0.0454

BOUNDS ON CONDITION NUMBER: 1.004671, 4.018686

THE ABOVE MODEL IS THE BEST 2 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 3 VARIABLE SD2 ENTERED R SQUARE = 0.75829472 R= 0.8708
C(P) = 3.21474511

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	186.86310738	62.28770246	204.97	0.0001
ERROR	196	59.56233062	0.30388944		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.81770782				
WS	-1.41993850	0.06761035	134.03813334	441.08	0.0001
PS2	-0.65702844	0.24145049	2.25023451	7.40	0.0071
SD2	-0.55421209	0.30451423	1.00658955	3.31	0.0703

BOUNDS ON CONDITION NUMBER: 2.30231, 16.63024

THE ABOVE MODEL IS THE BEST 3 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 4 VARIABLE SD1 ENTERED R SQUARE = 0.75933769 R=0.8714
C(P) = 4.37238138

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	187.12012253	46.78003063	153.82	0.0001
ERROR	195	59.30531547	0.30412982		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	7.05732108				
WS	-1.40760857	0.06895412	126.73669392	416.72	0.0001
PS2	-0.64021741	0.24223722	2.12438012	6.99	0.0089
SD2	-0.59426528	0.30773464	1.13414074	3.73	0.0549
SD1	-0.37330101	0.40607785	0.25701515	0.85	0.3591

BOUNDS ON CONDITION NUMBER: 2.349406, 27.00048

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

THE ABOVE MODEL IS THE BEST 4 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 5 VARIABLE PS1 ENTERED R SQUARE = 0.75979875 R=0.87166
C(P) = 6.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	5	187.23374050	37.44674810	122.73	0.0001
ERROR	194	59.19169750	0.30511184		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	7.10029135				
WS	-1.40726024	0.06906771	126.66532480	415.14	0.0001
PS2	-0.62192761	0.24447220	1.97460293	6.47	0.0117
PS1	-0.09574329	0.15689690	0.11361797	0.37	0.5424
SD2	-0.62930674	0.31353442	1.22917409	4.03	0.0461
SD1	-0.36617935	0.40690032	0.24709883	0.81	0.3693

BOUNDS ON CONDITION NUMBER: 2.430948, 40.22197

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

THE ABOVE MODEL IS THE BEST 5 VARIABLE MODEL FOUND.

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 1 VARIABLE WS ENTERED R SQUARE = 0.74914895 R= 0.865
C(P) = 17.31655876

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	184.60935753	184.60935753	591.31	0.0001
ERROR	198	61.81608047	0.31220243		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.65909306				
WS	-1.46926648	0.06042155	184.60935753	591.31	0.0001

BOUNDS ON CONDITION NUMBER: 1, 1

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 2 VARIABLE N ENTERED R SQUARE = 0.76375424 R = 0.8739
C(P) = 6.89663599

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	188.20847309	94.10423655	318.44	0.0001
ERROR	197	58.21696491	0.29551759		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.29447330				
N	0.04751920	0.01361642	3.59911556	12.18	0.0006
WS	-1.41393836	0.06088521	159.37519307	539.31	0.0001

BOUNDS ON CONDITION NUMBER: 1.072736, 4.290943

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 3 VARIABLE SD1 ENTERED R SQUARE = 0.76785092 R = 0.8763
C(P) = 5.41293285

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	189.21800032	63.07266677	216.10	0.0001
ERROR	196	57.20743768	0.29187468		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.77762246				
N	0.05255999	0.01380100	4.23336427	14.50	0.0002
WS	-1.39396727	0.06145425	150.17501404	514.52	0.0001
SD1	-0.72594294	0.39033876	1.00952722	3.46	0.0644

BOUNDS ON CONDITION NUMBER: 1.115772, 9.837772

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 4 VARIABLE PS2 ENTERED R SQUARE = 0.77010513 $R = 0.87756$
C(P) = 5.49601748

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	189.77349491	47.44337373	163.30	0.0001
ERROR	195	56.65194309	0.29052279		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.11854266				
N	0.05012138	0.01388149	3.78751311	13.04	0.0004
WS	-1.40528870	0.06185603	149.95027668	516.14	0.0001
PS2	-0.24276819	0.17556662	0.55549459	1.91	0.1683
SD1	-0.58345729	0.40283573	0.60945600	2.10	0.1491

BOUNDS ON CONDITION NUMBER: 1.134076, 17.88944

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 5 VARIABLE SD2 ENTERED R SQUARE = 0.77185194 R = 0.87855
C(P) = 6.01058136

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	5	190.20395300	38.04079060	131.27	0.0001
ERROR	194	56.22148500	0.28980147		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.54742320				
N	0.04634314	0.01420661	3.08383047	10.64	0.0013
WS	-1.36978961	0.06830135	116.56004061	402.21	0.0001
PS2	-0.44890242	0.24362667	0.98390875	3.40	0.0669
SD2	-0.37515144	0.30781620	0.43045809	1.49	0.2244
SD1	-0.62933511	0.40409249	0.70291521	2.43	0.1210

BOUNDS ON CONDITION NUMBER: 2.466872, 41.31002

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 6 VARIABLE PS1 ENTERED R SQUARE = 0.77304034 $R = 0.879$
C(P) = 7.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	6	190.49680499	31.74946750	109.56	0.0001
ERROR	193	55.92863301	0.28978566		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.59880218				
N	0.04798479	0.01429978	3.26306449	11.26	0.0010
WS	-1.36788700	0.06832571	116.14728073	400.80	0.0001
PS2	-0.41256833	0.24628654	0.81318117	2.81	0.0955
PS1	-0.15472465	0.15391249	0.29285199	1.01	0.3160
SD2	-0.42401787	0.31162248	0.53652214	1.85	0.1752
SD1	-0.62689596	0.40408876	0.69745198	2.41	0.1224

BOUNDS ON CONDITION NUMBER: 2.528395, 57.50187

FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

NO OTHER VARIABLES MET THE 0.5000 SIGNIFICANCE LEVEL FOR ENTRY INTO THE MODEL.

SUMMARY OF FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP	VARIABLE ENTERED	NUMBER IN	PARTIAL R**2	MODEL R**2	C(P)	F	PROB>F
1	WS	1	0.7491	0.7491	17.3166	591.3130	0.0001
2	N	2	0.0146	0.7638	6.8966	12.1790	0.0006
3	SD1	3	0.0041	0.7679	5.4129	3.4588	0.0644
4	PS2	4	0.0023	0.7701	5.4960	1.9121	0.1683
5	SD2	5	0.0017	0.7719	6.0106	1.4854	0.2244
6	PS1	6	0.0012	0.7730	7.0000	1.0106	0.3160

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 0 ALL VARIABLES ENTERED R SQUARE = 0.77304034 $R = 0.879$
C(P) = 7.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	6	190.49680499	31.74946750	109.56	0.0001
ERROR	193	55.92863301	0.28978566		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.59880218				
N	0.04798479	0.01429978	3.26306449	11.26	0.0010
WS	-1.36788700	0.06832571	116.14728073	400.80	0.0001
PS2	-0.41256833	0.24628654	0.81318117	2.81	0.0955
PS1	-0.15472465	0.15391249	0.29285199	1.01	0.3160
SD2	-0.42401787	0.31162248	0.53652214	1.85	0.1752
SD1	-0.62689596	0.40408876	0.69745198	2.41	0.1224

BOUNDS ON CONDITION NUMBER: 2.528395, 57.50187

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 1 VARIABLE PS1 REMOVED R SQUARE = 0.77185194 R = 0.87855
C(P) = 6.01058136

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	5	190.20395300	38.04079060	131.27	0.0001
ERROR	194	56.22148500	0.28980147		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.54742320				
N	0.04634314	0.01420661	3.08383047	10.64	0.0013
WS	-1.36978961	0.06830135	116.56004061	402.21	0.0001
PS2	-0.44890242	0.24362667	0.98390875	3.40	0.0669
SD2	-0.37515144	0.30781620	0.43045809	1.49	0.2244
SD1	-0.62933511	0.40409249	0.70291521	2.43	0.1210

BOUNDS ON CONDITION NUMBER: 2.466872, 41.31002

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 2 VARIABLE SD2 REMOVED R SQUARE = 0.77010513 $R = 0.87756$
C(P) = 5.49601748

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	189.77349491	47.44337373	163.30	0.0001
ERROR	195	56.65194309	0.29052279		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.11854266				
N	0.05012138	0.01388149	3.78751311	13.04	0.0004
WS	-1.40528870	0.06185603	149.95027668	516.14	0.0001
PS2	-0.24276819	0.17556662	0.55549459	1.91	0.1683
SD1	-0.58345729	0.40283573	0.60945600	2.10	0.1491

BOUNDS ON CONDITION NUMBER: 1.134076, 17.88944

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP 3 VARIABLE PS2 REMOVED R SQUARE = 0.76785092 $R = 0.8763$
C(P) = 5.41293285

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	189.21800032	63.07266677	216.10	0.0001
ERROR	196	57.20743768	0.29187468		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.77762246				
N	0.05255999	0.01380100	4.23336427	14.50	0.0002
WS	-1.39396727	0.06145425	150.17501404	514.52	0.0001
SD1	-0.72594294	0.39033876	1.00952722	3.46	0.0644

BOUNDS ON CONDITION NUMBER: 1.115772, 9.837772

ALL VARIABLES IN THE MODEL ARE SIGNIFICANT AT THE 0.1000 LEVEL.

SUMMARY OF BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE GOODNESS

STEP	VARIABLE REMOVED	NUMBER IN	PARTIAL R**2	MODEL R**2	C(P)	F	PROB>F
1	PS1	5	0.0012	0.7719	6.0106	1.0106	0.3160
2	SD2	4	0.0017	0.7701	5.4960	1.4854	0.2244
3	PS2	3	0.0023	0.7679	5.4129	1.9121	0.1683

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 1 VARIABLE WS ENTERED R SQUARE = 0.74914895 $R = 0.865$
C(P) = 17.31655876

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	184.60935753	184.60935753	591.31	0.0001
ERROR	198	61.81608047	0.31220243		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.65909306				
WS	-1.46926648	0.06042155	184.60935753	591.31	0.0001

BOUNDS ON CONDITION NUMBER: 1, 1

THE ABOVE MODEL IS THE BEST 1 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 2 VARIABLE N ENTERED R SQUARE = 0.76375424 R= 0.8739
C(P) = 6.89663599

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	188.20847309	94.10423655	318.44	0.0001
ERROR	197	58.21696491	0.29551759		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.29447330				
N	0.04751920	0.01361642	3.59911556	12.18	0.0006
WS	-1.41393836	0.06088521	159.37519307	539.31	0.0001

BOUNDS ON CONDITION NUMBER: 1.072736, 4.290943

THE ABOVE MODEL IS THE BEST 2 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 3 VARIABLE SD1 ENTERED R SQUARE = 0.76785092 R= 0.8763
C(P) = 5.41293285

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	189.21800032	63.07266677	216.10	0.0001
ERROR	196	57.20743768	0.29187468		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.77762246				
N	0.05255999	0.01380100	4.23336427	14.50	0.0002
WS	-1.39396727	0.06145425	150.17501404	514.52	0.0001
SD1	-0.72594294	0.39033876	1.00952722	3.46	0.0644

BOUNDS ON CONDITION NUMBER: 1.115772, 9.837772

THE ABOVE MODEL IS THE BEST 3 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 4 VARIABLE PS2 ENTERED R SQUARE = 0.77010513 R = 0.87756
C(P) = 5.49601748

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	189.77349491	47.44337373	163.30	0.0001
ERROR	195	56.65194309	0.29052279		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.11854266				
N	0.05012138	0.01388149	3.78751311	13.04	0.0004
WS	-1.40528870	0.06185603	149.95027668	516.14	0.0001
PS2	-0.24276819	0.17556662	0.55549459	1.91	0.1683
SD1	-0.58345729	0.40283573	0.60945600	2.10	0.1491

BOUNDS ON CONDITION NUMBER: 1.134076, 17.88944

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

THE ABOVE MODEL IS THE BEST 4 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 5 VARIABLE SD2 ENTERED R SQUARE = 0.77185194 R=0.87855
C(P) = 6.01058136

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	5	190.20395300	38.04079060	131.27	0.0001
ERROR	194	56.22148500	0.28980147		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.54742320				
N	0.04634314	0.01420661	3.08383047	10.64	0.0013
WS	-1.36978961	0.06830135	116.56004061	402.21	0.0001
PS2	-0.44890242	0.24362667	0.98390875	3.40	0.0669
SD2	-0.37515144	0.30781620	0.43045809	1.49	0.2244
SD1	-0.62933511	0.40409249	0.70291521	2.43	0.1210

BOUNDS ON CONDITION NUMBER: 2.466872, 41.31002

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

THE ABOVE MODEL IS THE BEST 5 VARIABLE MODEL FOUND.

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

STEP 6 VARIABLE PS1 ENTERED R SQUARE = 0.77304034 R= 0.879
C(P) = 7.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	6	190.49680499	31.74946750	109.56	0.0001
ERROR	193	55.92863301	0.28978566		
TOTAL	199	246.42543800			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	6.59880218				
N	0.04798479	0.01429978	3.26306449	11.26	0.0010
WS	-1.36788700	0.06832571	116.14728073	400.80	0.0001
PS2	-0.41256833	0.24628654	0.81318117	2.81	0.0955
PS1	-0.15472465	0.15391249	0.29285199	1.01	0.3160
SD2	-0.42401787	0.31162248	0.53652214	1.85	0.1752
SD1	-0.62689596	0.40408876	0.69745198	2.41	0.1224

BOUNDS ON CONDITION NUMBER: 2.528395, 57.50187

MAXIMUM R-SQUARE IMPROVEMENT FOR DEPENDENT VARIABLE GOODNESS

THE ABOVE MODEL IS THE BEST 6 VARIABLE MODEL FOUND.

```
program PATWRITE;
 var
  PN, LN, X : INTEGER;
  A : packed array[1..32, 1..32] of BOOLEAN;
  F : file of BOOLEAN;
  ST, NAME, INSTRING, DATAFILE : string;
  CH : CHAR;

 procedure PINPUT;
  var
   I, J, K : INTEGER;
 begin
  WRITELN;
  WRITELN;
  WRITELN('PATTERN NO.:  ', PN : 3);
  WRITELN;
  for I := 1 to X do
   begin
    WRITE('INPUT ROW  ', I : 2, '    ');
    READLN(ST);
    for J := 1 to X do
     A[I, J] := (ST[J] = '1')
   end;
  WRITELN;

  repeat
   WRITELN;
   WRITE('MAKE ANY CORRECTIONS (Y/N) ? ');
   READLN(CH);
   if CH = 'Y' then
    begin
     WRITELN;
     WRITE('            ROW NUMBER?');
     READLN(I);
     WRITE('        COLUMN NUMBER?');
     READLN(J);
     WRITE('CORRECT VALUE (1/0)?');
     READLN(K);
     A[I, J] := (K = 1)
    end;
  until CH = 'N'
```

```
  end;

  procedure PWRITE;
   var
    I, J : INTEGER;
  begin
   WRITELN(DATAFILE);
   REWRITE(F, DATAFILE);
   for I := 1 to X do
    for J := 1 to X do
     begin
      F^ := A[I, J];
      PUT(F);
     end;
   CLOSE(F);
  end;
 begin
  PAGE(OUTPUT);
  WRITE('PATTERN NAME?  ');
  READLN(NAME);
  WRITELN;
  WRITE('FIRST PATTERN NUMBER?');
  READLN(PN);
  WRITELN;
  WRITE('LAST PATTERN NUMBER?');
  READLN(LN);
  WRITELN;
  WRITE('PATTERN SQUARE GRID SIZE (X<33)? ');
  READLN(X);

  repeat
   WRITE('THE NUMBER OF THE FOLLOWING PATTERN?');
   READLN(INSTRING);

   DATAFILE := CONCAT(NAME, INSTRING, '.DATA');
   PINPUT;
   PWRITE;
   PN := PN + 1;
  until PN > LN;
 end.
```

```
program Symmetropy;
 var
  C : array[0..2] of CHAR;
  W, PW : array[0..31, 0..31] of INTEGER;
  D, DD : packed array[0..31, 0..31] of BOOLEAN;
  V : array[0..3] of INTEGER;
  SV1, SV2 : array[1..5] of REAL;
  T, TT, X, Y, Z, PN, N, L, SIZE : INTEGER;
  DF : file of BOOLEAN;
  INSTRING, DATAFILE, NAME : string;
  Y2, S2, YS, YY, YF, SF : REAL;
  P : TEXT;
  CH : CHAR;
 procedure WALSH (T : INTEGER);
  var
   R : array[0..31] of INTEGER;
   B : array[0..6] of INTEGER;
   U, S, K, A, I, J : INTEGER;
 begin
  case T of
   1 :
    S := 1;
   2 :
    S := 3;
   3 :
    S := 7;
   4 :
    S := 15;
   5 :
    S := 31;
  end;
  U := (S + 1) div 2 - 1;
  for J := 1 to T do
   B[J] := 0;
  for K := 0 to S do
   begin
    I := 0;
    R[U + 1] := 1;
    while I <= (T - 2) do
     begin
      for J := 0 to U do
```

```
        R[J] := B[T - I] + R[S - J];
      A := 1;
      if I <> 0 then
        for J := 1 to I do
          A := A * 2;
      for J := S downto A do
        R[J] := R[J - A];
      I := I + 1;
    end;

  for J := 0 to S do
    R[J] := R[S - J] + B[1];
  for J := S downto 0 do
    begin
      R[J] := 2 * (R[J] mod 2) - 1;
      W[K, S - J] := R[J];
    end;
  B[1] := B[1] + 1;
  for J := 1 to T do
    if B[J] = 2 then
      begin
        B[J] := 0;
        B[J + 1] := B[J + 1] + 1;
      end;
  end;
end;

procedure DATAREAD;{Rading data for partial symmetropies}
 var
  I, J : INTEGER;
begin
 RESET(DF, DATAFILE);
 for I := 0 to X - 1 do
  for J := 0 to X - 1 do
   begin
    D[I, J] := DF^;
    GET(DF);
   end;
 CLOSE(DF);
 for I := 0 to X - 1 do
  for J := 0 to X - 1 do
```

```
    DD[I, J] := D[I, J];{To make the name of the output matrix the same as in
          DREADWHOLE}
  WRITELN(P, 'PATTERN: ', NAME, INSTRING);
  for I := 0 to X - 1 do
   begin
    WRITELN(P);
    for J := 0 to X - 1 do
     case D[I, J] of
      TRUE :
       WRITE(P, '*');
      FALSE :
       WRITE(P, '-');
     end;
   end;
end;

procedure DREADWHOLE;{reading data for whole symmetropy}
 var
  I, J, II, JJ, S : INTEGER;
begin
 RESET(DF, DATAFILE);
 for I := 0 to X - 1 do
  for J := 0 to X - 1 do
   begin
    D[I, J] := DF^;
    GET(DF);
   end;
 CLOSE(DF);
 begin
  for I := 0 to SIZE - 1 do
   for J := 0 to SIZE - 1 do
    DD[I, J] := FALSE
 end;
 if ODD(X) then
  begin
   S := SIZE div 2 - X;{A constant foradjusting the initial position of DD
          matrix}
   for I := 0 to X - 1 do
    for J := 0 to X - 1 do
     for II := 0 to 1 do
      for JJ := 0 to 1 do
```

```
          DD[S + 2 * I + II, S + 2 * J + JJ] := D[I, J]
    end
  else
    begin
      S := (SIZE - X) div 2;{A constant fo adjusting the initial position of DD
             matrix}
      for I := 0 to X - 1 do
        for J := 0 to X - 1 do
          DD[S + I, S + J] := D[I, J]
    end;
  if X < SIZE then
    WRITELN(P, 'NESTED PATTERN: ', NAME, INSTRING)
  else
    WRITELN(P, 'PATTERN: ', NAME, INSTRING);{ For X=size}

  for I := 0 to SIZE - 1 do
    begin
      WRITELN(P);
      for J := 0 to SIZE - 1 do
        case DD[I, J] of
          TRUE :
            WRITE(P, '*');
          FALSE :
            WRITE(P, '-');
        end;
    end;
end;

procedure SYM2;
  var
    QM : array[0..30, 0..30] of REAL;
    I, J, II, JJ, PT, XX : INTEGER;
    Q, QQ, YR : REAL;
begin
  PT := 0;
  Q := 0.0;
  QQ := 0.0;
  for II := 0 to X - 2 do
    for JJ := 0 to X - 2 do
      begin
        for I := II to II + 1 do
```

```
        for J := JJ to JJ + 1 do
          PT := PT + ORD(D[I, J]);
      if ODD(PT) then
        begin
          Q := Q + 1.58496;
          QQ := QQ + 2.51211;
          QM[II, JJ] := 1.58;
        end
      else
        QM[II, JJ] := 0.0;
      PT := 0;
    end;
  WRITELN(P);
  for I := 0 to X - 2 do
    begin
      WRITELN(P);
      for J := 0 to X - 2 do
        WRITE(P, QM[I, J] : 6 : 2);
    end;
  XX := (X - 1) * (X - 1);
  YR := (QQ - Q * Q / XX) / XX;
  if YR < 0.0 then
    YR := 0.0;
  Y2 := ROUND(Q * 100 / XX) / 100;
  S2 := ROUND(100 * SQRT(YR)) / 100;
end;

procedure COMPONENT (M, N : INTEGER);
begin
  if (M < 1) and (N < 1) then
  else
    Z := Z + PW[M, N];
  if (M < 1) and (N < 1) then
  else if ODD(M + 1) and ODD(N) then
    V[0] := V[0] + PW[M, N]
  else if ODD(M) and ODD(N + 1) then
    V[1] := V[1] + PW[M, N]
  else if ODD(M) and ODD(N) then
    V[2] := V[2] + PW[M, N]
  else if ODD(M + 1) and ODD(N + 1) then
    V[3] := V[3] + PW[M, N];
```

```
end;

procedure SYMANY (SIZE : INTEGER);
 var
  QM : array[0..31, 0..31] of REAL;
  D0 : packed array[0..31, 0..31] of BOOLEAN;
  YR, Y, YH, ZZ : REAL;
  I, J, I0, J0, II, JJ, CW, M, N, XX : INTEGER;
begin
 if X < SIZE then
  X := SIZE;
 for II := 0 to X - SIZE do
  for JJ := 0 to X - SIZE do
   begin
    I0 := 0;
    for I := II to II + SIZE - 1 do
     begin
      J0 := 0;
      for J := JJ to JJ + SIZE - 1 do
       begin
        D0[I0, J0] := DD[I, J];
        J0 := J0 + 1;
       end;
      I0 := I0 + 1;
     end;
    Z := 0;
    for I := 0 to 3 do
     V[I] := 0;
    for M := 0 to SIZE - 1 do
     for N := 0 to SIZE - 1 do
      begin
       CW := 0;
       for I := 0 to SIZE - 1 do
        for J := 0 to SIZE - 1 do
         CW := CW + W[N, I] * W[M, J] * ORD(D0[I, J]);
       PW[M, N] := CW * CW;{power spectra?}

       COMPONENT(M, N);

      end;
```

```
      Y := 0.0;
      if Z > 0 then
        begin
          for J := 0 to 3 do
            begin
              if V[J] < 1 then
                ZZ := 1.0
              else
                ZZ := Z / V[J];
              Y := Y + (V[J] / Z) * LN(ZZ);
            end;
          YH := Y / LN(2);{symmetropy}
        end
      else
        YH := 0.0;

      YS := YS + YH;
      YY := YY + YH * YH;
      QM[II, JJ] := ROUND(YH * 100) / 100;{partial symmetropy}
    end;
  WRITELN(P);
  for I := 0 to X - SIZE do
    begin
      WRITELN(P);
      for J := 0 to X - SIZE do
        WRITE(P, QM[I, J] : 6 : 2);
    end;
  XX := (X - SIZE + 1) * (X - SIZE + 1);
  YF := ROUND(YS * 100 / XX) / 100;{SYMMETROPY}
  YR := (YY - YS * YS / XX) / XX;
  if YR < 0.0 then
    YR := 0.0;
  SF := ROUND(100 * SQRT(YR)) / 100;{std deviation}
end;

function POWER (T : INTEGER) : INTEGER;
begin
  Z := 1;
  repeat
    Z := 2 * Z;
    T := T - 1;
```

```
  until T < 1;
  POWER := Z;
end;
function STR (PN : INTEGER) : string;
begin
  N := PN mod 10;
  C[0] := CHR(N + 48);
  PN := (PN - N) div 10;
  N := PN mod 10;
  C[1] := CHR(N + 48);
  PN := (PN - N) div 10;
  N := PN mod 10;
  C[2] := CHR(N + 48);
  STR := CONCAT(C[2], C[1], C[0]);
end;

procedure WHOLE;
begin
  case X of
    3, 6, 8 :
      T := 3;
    4 :
      T := 2;
    5, 7, 10, 12, 14, 16 :
      T := 4;
    9, 11, 13, 15, 32 :
      T := 5;
  end;
  SIZE := POWER(T);
  Y := X;
  WALSH(T);
  repeat
    if PN mod 2 = 1 then
      PAGE;
    INSTRING := STR(PN);
    DATAFILE := CONCAT(NAME, INSTRING, '.DATA');
    DREADWHOLE;{Reading data for whole symmetropy}
    YS := 0.0;
    YY := 0.0;
    SYMANY(SIZE);
    WRITELN(P);
```

```
    WRITELN(P);
    WRITELN(P, 'WHOLE SYMMETROPY = ', YF : 5 : 2);
    WRITELN(P,    '-----------------------------');
    WRITELN(P);
    X := Y;{to restore the initial value of X, cf.SYMANY}
    PN := PN + 1;
  until PN > L;
end;

begin {MAIN}
  PAGE(OUTPUT);
  REWRITE(P, 'Printer:');
  WRITE('       PATTERN NAME?');
  READLN(NAME);
  WRITE('FIRST PATTERN NUMBER?');
  READLN(PN);
  WRITE('LAST PATTERN NUMBER?');
  READLN(L);
  WRITELN;
  WRITELN('INPUT SQUARE GRID SIZE (X<I7 OR =32)');
  READLN(X);
  WRITELN;
  WRITE('ONLY WHOLE SYMMETROPY (Y/N)? ');
  READLN(CH);
  if CH = 'Y' then
    WHOLE;
  if CH = 'N' then
    begin
      if (X < 4) then
        T := 1;
      if (X > 3) and (X < 8) then
        T := 2;
      if (X > 7) and (X < 16) then
        T := 3;
      if (X > 15) and (X < 32) then
        T := 4;
      if (X > 31) then
        T := 5;
      repeat
        if PN mod 2 = 1 then
          PAGE;
```

```
INSTRING := STR(PN);
DATAFILE := CONCAT(NAME, INSTRING, '.DATA');
DATAREAD;
TT := T;
repeat
  YS := 0.0;
  YY := 0.0;
  if TT > 1 then
    begin
      WALSH(TT);
      case TT of
        2 :
          SIZE := 4;
        3 :
          SIZE := 8;
        4 :
          SIZE := 16;
        5 :
          SIZE := 32;
      end;
      SYMANY(SIZE);
      SV1[TT] := YF;{mean symmetropy}
      SV2[TT] := SF;{std deviation}
    end
  else
    begin
      SYM2;
      SV1[1] := Y2;{mean symmetropy}
      SV2[1] := S2;{std deviation}
    end;
  TT := TT - 1;
until TT < 1;
WRITELN(P);
WRITELN(P);
WRITE(P, 'M = ');
for TT := T downto 1 do
  WRITE(P, SV1[TT] : 6 : 2);
WRITELN(P);
WRITE(P, 'SD = ');
for TT := T downto 1 do
  WRITE(P, SV2[TT] : 6 : 2);
```

```
      WRITELN(P);
      WRITELN(P,    '------------------');
      WRITELN(P);
      PN := PN + 1;
    until PN > L;
  end;

end.
```