PUZZLE DESIGN TOURNAMENT 2003

PUZZLE 01
Alan O'Donnell     aod@webtribe.net

Rotate the tiles in the grid, and draw a path to produce the highest score. The path produced must move to an adjacent tile and you don't have to visit all the tiles. No tile may be visited more than once, and it is not a requirement to return to the starting tile. Touching numbers of adjacent tiles along the path are multiplied together. Your score is the sum of the individual products produced. Maximize this score.

Example:

Answer key: Write your score first. Then list the tiles visited in order. The tiles visited must be listed as their letter, followed by their orientation (indicated by the uppermost digit in your rotation of the tile). For the example, the answer key would be: 108: A3,C2,F6,G6,E2,B2,D1,A3

(5x3 + 4x6 + 1x5 + 3x4 + 2x5 + 6x6 + 1x6 = 108)

PUZZLE 02
Andreas Bolota     andreas@campeuronet.com

The given diagram contains areas of various values (positive inside the grid, negative outside). Two circles will cover the diagram resulting in four different zones as shown; the circle coordinates and diameters must be considered in terms of grid nodes with integral numbers precision. Note that the four zones can still be identified even in particular cases: a big circle containing a small circle (B=C), non-intersecting circles (C=0), etc. Considering the total sum of grid-values covered by each of the four circle-zones, your task is to minimize the total of differences between these totals (i.e. cumulated absolute values of |A-B| + |A-C| + |A-D| + |B-C| + |B-D| + |C-D|).

Example with one circle:

Answer key: Write your score first. Then write the totals for each of the four zones, and for each circle give its center coordinates and diameter. For the example the answer key would be: 3: A=2, D=5, (3, 0), 3
PUZZLE 03
Aziz Ates azizates@yahoo.com

We have two sets of pentominoes for a total of 24. You must place them in the region below in such a way that if a pentamino is placed then the other one of the same pentomino must be placed too. Pentominoes cannot overlap. Each pentamino of a couple placed in the region must be symmetric with respect to a point. All points of symmetries of couples are different and lie on a straight line, not necessarily horizontal or vertical. The region is divided by numbered squares. Each square in the nth line has a value of n. Your aim is to minimize the sum of the values of empty squares.

Example:

Answer key: Write your sum first. Then write the contents of the grid row by row, using points (.) for blank squares and the corresponding letters for the occupied squares. For the example, the answer key would be: 45: YYYYLLLL., .XY.X..L., XXXXXX..., LX..X.Y.., LLLL.YYYY

PUZZLE 04
Cihan Altay cihan@otuzoyun.com

Locate non-zero numbers into the grid below so that each even number tells the number of odd numbers in the surrounding squares and each odd number tells the number of even numbers in the surrounding squares. Same numbers can not be neighbours. Two squares are neighbours if they touch even at a point. There are four big squares in the grid, all must be filled with different numbers. When you finish, all numbers must be connected to each other. Maximize the total of the numbers in the grid.

Example:

Answer key: Write your total first. Then write the contents of the grid row by row, representing blank squares with points. For each big square write the number on it four times. For the example, the answer key would be: 44: 1...1.1..1, 2.1.34..2., .344.255..., .244..55.., ..32..2.21, ....1.1...
PUZZLE 05

There are 121 points in the grid below. The aim of the puzzle is to set the longest continuous path from point A5 to point K5. Each step (line segment between successive points) must be longer than the previous one. Path can not cross or touch itself. Length of each individual line will be calculated up to two decimal digits.

Example:

Lengths of lines in order:
1.00, 1.41, 2.24, 2.83, 3.16
Total: 10.64

Answer key: Write your length first. Then write the coordinates of the points forming the path in the order they are connected. For the example, the answer key would be: 10.64: A2,A1,B2,D1,B3,E2

PUZZLE 06

This is a game involving prime numbers less than 1000. On each of nine turns you will place a different digit 1 through 9 into one of the squares of the 3x3 grid. On the first turn, place a prime digit into the center square (E). Score this number of points. On each subsequent turn, place an unused digit into an empty square so as to form a prime 2 or 3 digit number in the grid, reading up, down, left, right, or in any of 4 diagonal directions, and either starting or ending with the digit you just placed. For each direction in which there is a digit adjacent to the one you just placed, score the largest prime number formed in this fashion. Your score for the game is the sum of the scores for 9 turns. Maximize this score.

Example:

Grid for notation:

Answer key: Write your score first. Then write the plays for the nine turns, each written using the letter of that square and the digit you placed in the square. For the example, the answer key would be: 2562: E3 I1 H7 G9 A4 C8 B5 D6 F2
PUZZLE 07  Ken Duisenberg  kduis@yahoo.com

On a 6x7 grid, place non-intersecting line segments, each beginning and ending on a unique grid point. A line ending on another line is considered to intersect. For example, a line ending on either (1,1) or (2,2) intersects the line from (1,1) to (3,3). Each line must be a different length from every other. Maximize the total length of lines.

Example:

```
 1 2 3 4 5 6 7
1 ○ ○ ○ ○ ○ ○ ○
2 ○ ○ ○ ○ ○ ○ ○
3 ○ ○ ○ ○ ○ ○ ○
4 ○ ○ ○ ○ ○ ○ ○
5 ○ ○ ○ ○ ○ ○ ○
6 ○ ○ ○ ○ ○ ○ ○
```

Total length: 5.243

Answer key: Write your total length first, followed by the number of lines. Then list your lines in the form of (Ax,Ay,Bx,By). For the example, the answer key would be: 5.243, 3, (1,1,1,2), (3,1,1,3), (3,2,3)

PUZZLE 08  Mark Rich  richm@cs.wisc.edu

You have a 9x9 board with walls surrounding the perimeter and interspersed inside the board. Four robots, A, B, C and D, have been placed on the board along with four grey Goal squares. A robot can be shifted in four directions, Up, Down, Left or Right. A move consists of shifting a robot in one direction until that robot hits a wall or another robot.

Let a be the total length of the path created by moving robot A, likewise with b, c and d. Each robot has a different cost of movement. Your goal is to move the robots sequentially until all robots rest in a grey square and minimize the total \(= 2a + 3b + 5c + 7d\).

Example:

```
After these moves:
B: D
A: R D
B: L U R U D
C: D R U L D L R U
B: R
```

Answer key: Write your total followed by the sequence of moves used. For the example, the answer key would be: 164: BD, AR, AD, BL, BU, BR, BU, BL, BD, CD, CR, CU, CL, CD, CL, CD, CR, CU, BR
PUZZLE 09  Deepashanthi Srinivasan  deepashanthi_m@yahoo.com

We have a set of 28 dominoes (0-0, 0-1, 0-2, ..., 6-6). Place as many dominoes in the 5x5 grid without any blank place left. You can only place a domino (except first domino) in the grid if one edge of the domino is sharing the same number with placed domino (no matter whether the placed domino has already shared the same edge or not) and must be one blank to place the other edge. While placing the dominoes make sure each row/column sum is less than or equal to 15. Your score is the sum of all the numbers in the dominoes which have not been placed in the grid plus the sum of all row/column values. Maximize this score.

Example:

(10 is the maximum row/column sum)

```
A B C D
1 1 1 5 3 10
2 2 3 4 1 10
3 2 3 1 2 8
4 5 2 0 0 7
```

**Answer key:** Write your score first, followed by all the dominoes in the order to place along with the coordinates. For the example, the answer key would be: 169: 35:DC1, 15:BC1, 11:AB1, 12:A12, 22:A23, 25:A34, 45:C21, 14:DC2, 34:BC2, 33:B23, 23:B43, 13:CB3, 01:C43, 00:CD4, 02:D43

Total of dominoes left: 99
Total of row/column values: 70
Score: 99 + 70 = 169

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PUZZLE 10  Travis Taylor  travis_r_taylor@hotmail.com

Create a 5x5 magic square (that is a square with each row's, column's and each of the two main diagonal's sum is the same number) with the digits 1 through 25. Put a knight on any square to start. As the knight moves, points are collected as such: at the starting square, you gain the amount of points in that square, in the second square, you gain twice the amount of points in that square, in the third, you gain three times, and so on. A knight moves drawing an L-shape, as shown in the 3x3 example below. The knight's path cannot visit any square twice, and need not visit every square. Maximize your points.

Example:

```
8 1 6
3 5 7
4 9 2
```

**Answer key:** Write your score first. Then write the numbers in the magic square row by row. And add the numbers knight visits, in order. For the example, the answer key would be: 100: 816,357,492;8,9,6,3,2,1,4

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