Game Ten Thousand

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Coded in Python 3.11

Works in Python 3.11+

Created with VS Code and Ubuntu

Requirements:

- 6 dice (6d)
- Pencil
- Notebook

Procedure:

1. Player one throws all of his dice
2. Important is the own individual number of each dice
3. After each throw the ongoing player has to take out a number of dice according to following rules:
    a. Only an odd number of dice can be chosen exept for special cases
    b. A player can decide freely to choose a combination with an overall worse score then the optimum
    c. The player has to pick at least one dice to disgarde
    d. Only 5 and 1 can be chosen alone, all other numbers have to be of a quantity of 3 or more
    e. Different combinations of dice have different points connected to them:
    1) The lowest combination is a single 5 (50 Points)
    2) The second lowest combination is a single 1 (100 Points)
    3) 3x 2 (200 Points)
    4) 3x3 (300 Points)
    5) 3x4 (400 Points)
    6) 3x5 (500 Points)
    7) 3x6 (600 Points)
    8) SPECIAL CASE: 3x1 (1000 Points)
    9) SPECIAL CASE: all dice have to show [1,2,3,4,5,6] (no order but in the same throw) (2000 Points)
    10) 4x2 (2000 Points)
    11) 4x 3 (3000 Points)
    12) 4x4 (4000 Points)
    13) 4x5 (5000 Points)
    14) 4x6 (6000 Points)
    15) SPECIAL CASE: 4x1 (10 000 Points)
    16) 5x2 (20 000 Points)
    17) 5x3 (30 000 Points)
    18) 5x4 (40 000 Points)
    19) 5x5 (50 000 Points)
    20) 5x6 (60 000 Points)
    21) SPECIAL CASE: 5x1 (100 000 Points)
    22) 6x2 (200 000 Points)
    23) 6x3 (300 000 Points)

24) 6x4 (400 000 Points)
25) 6x5 (500 000 Points)
26) 6x6 (600 000 Points)
27) SPECIAL CASE: 6x1 (1 000 000 Points)

Points System:

5 = 50 Points

1 = 100 Points

N = Number 1-6

x = Count of dice with the same denomination

y = points of the combination

for n =! 1:

$$y = n \cdot 10^{x-1}$$

SPECIAL CASE:

If the dice show 1 as their denomination, the formular would be:

$$y = n \cdot 10^{x}$$

This is the case, because 1 is higher in the overall ranking and provides a higher score overall.

The corresponding conditions look like this:

$$f(x) = \begin{cases} 100, & (x = 1 \wedge n = 1) \\ 50, & (x = 1 \wedge n = 5) \\ undefined, & (x = 1 \wedge n \in \{2,3,4,6\}) \\ n * 10^{x}, & (n = 1 \wedge x \geq 3) \\ n * 10^{(x-1)}, & (n \geq 2 \wedge x \geq 3) \\ 0, & (n \in \{2,3,4,6\} \wedge x = 1) \end{cases}$$

$$f(x) = \begin{cases} 100, & if\ x = 1\ and\ n = 1 \\ 50, & if\ x = 1\ and\ n = 5 \\ undefined, & if\ x = 1\ and\ n \in \{2,3,4,6\} \\ n * 10^{x}, & if\ x \geq\ 3\ and\ n = 1 \\ n * 10^{(x-1)}, & if\ x \geq\ 3\ and\ n\ \geq\ 2 \\ 0, & if\ x\ =\ \{1,2\}\ and\ n \in \{2,3,4,6\} \end{cases}$$

Formular for evaluating the given Points under influenz of n and x using **Kronecker-Delta:**

$$y = 100 \cdot \delta_{(x,1)} \cdot \delta_{(n,1)} + 50 \cdot \delta_{(x,1)} \cdot \delta_{(n,5)} + (n \cdot 10^{x}) \cdot \delta_{(n,1)} \cdot H(x-3) + \left(n \cdot 10^{(x-1)}\right) \cdot H(n-2) * H(x-3)$$

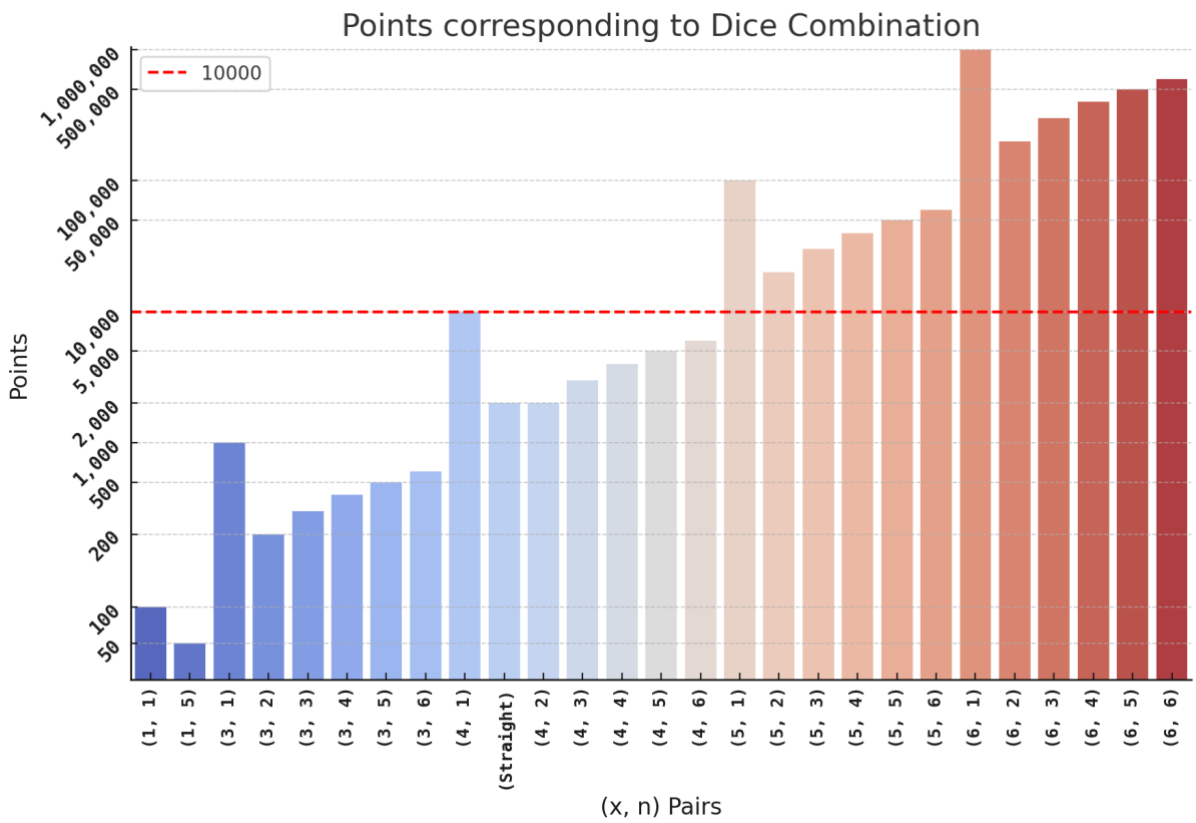
$$y = 100 \cdot 1_{((x=1,n=1))} + 50 \cdot 1_{((x=1,n=5))} + (n \cdot 10^{x}) \cdot 1_{((n=1,x\geq 3))} + \left(n \cdot 10^{(x-1)}\right) \cdot 1_{((n\geq 2,x\geq 3))}$$

The value table looks like this:

X	N	Y
1	1	100
1	2	-
1	3	-
1	4	-
1	5	50
1	6	-
3	1	1 000
3	2	200
3	3	300
3	4	400
3	5	500
3	6	600
4	1	10 000
6	**STRAIGHT**	2 000
4	2	2 000
4	3	3 000
4	4	4 000
4	5	5 000
4	6	6 000
5	1	100 000
5	2	20 000
5	3	30 000
5	4	40 000
5	5	50 000
5	6	60 000
6	1	1 000 000
6	2	200 000
6	3	300 000
6	4	400 000
6	5	500 000

6	6	600 000

As a diagramm the different combinations would look like this (NO REAL DISTRIBUTION):



Quation_Points_clean.text