CS161: Introduction to Computer Science
Lab Assignment 10

The goal of this week’s lab is to give you more practice with arrays, for-loops, and static methods. You will use your detective skills (and your math skills) to investigate the fairness of various die classes.

1 Die Experiments

Create a new Java class called DieStats. The DieStats class is responsible for creating and rolling a die. After rolling the die, various statistics should be printed to the screen.

Usually, all of this code would go inside of the main() method. However, if we did this main() would become too long. Instead, you should organize your code into private, static methods to keep the main() method short and to cut down on any repeated code.

Overall, you should:

1. Prompt the user to enter the number of sides for the die and the number of times to roll the die. Continue prompting the user until they enter a valid number of sides (i.e. greater than 1) and a valid number of rolls (i.e. more than 0).
2. Once you have this information, create an instance of the Die class with the appropriate number of sides. You’ll also need to create an array that will hold the number of times each face value is rolled.
3. Roll the die the specified number of times recording the face value each time.

Once you have rolled the die, you should compute the following statistics about the rolls.

1. A (sideways) histogram of the number of times each face value was rolled (see example below)
2. The minimum and maximum number of rolls in the array.
3. Finally, compute the average face value. You can use the following equation to compute the average face value:

\[
\text{avg} = \frac{\sum_{i=1}^{S} i \cdot \text{array}[i-1]}{\text{numRolls}}
\]

where \( S \) is the number of sides of the die, \( \text{array}[i-1] \) is the number of times the face value \( i \) was rolled, and \( \text{numRolls} \) is the total number of times the die was rolled. Computing the average face value doesn’t have much meaning in the real world but it may prove helpful later on.
Here's a sample run of my program.

```plaintext
How many sides should the die have?
1
How many sides should the die have?
6
How many times should the die be rolled?
0
How many times should the die be rolled?
100

=== Die class ===
Number of rolls for each face:
1:************************21
2:***********11
3:************************21
4:************************19
5:***********8
6:************************20

Min: 8
Max: 21
Avg: 3.42
```

Here, \( \text{Avg} = \frac{1 \times 21 + 2 \times 11 + 3 \times 21 + 4 \times 19 + 5 \times 8 + 6 \times 20}{100} = 3.24 \); 

2 Submitting Your Lab

Rename your folder with both of your names and then upload it to Canvas.