**AP Computer Science – D20 Project**

Dungeons and Dragons uses a 20 sided die in its gameplay. It is often referred to as a **d20**.

You are going to write a program that will simulate the rolling of a d20. The game rules work like this:

1. You are going to create an integer array called **rolls**.
2. Your program will run on a menu system.
3. The menu has the following options:
   1. Roll Dice – The user is prompted for the number of rolls (numRolls). The program will then populate the array with new, random dice rolls in the range of 1 to 20. Based on the user’s choice for Menu choice # 5, the rolls with either be displayed or not as they are generated.
   2. Show Roll Range – This option will enable the user to enter a range of dice rolls to output. It should work as long as the indices provided are valid, otherwise an appropriate message is outputted. If they enter the same value twice, it will output all dice rolls generated. The range should work whether the lower value is entered first or second. (See example)
   3. Show Specific Roll – This user will be prompted to enter a number from 1 to numRolls. The program will output the dice value that was die roll (essentially the value stored at that index). If the user tries to enter an invalid value here, your program should request a valid range from them and **NOT** error out.
   4. Show statistics – Several statistics will be displayed at this point:
      * 1. Average roll – This should show what the average die roll was throughout the array
        2. Show d20 Frequency – This will output the number of times each value (1 to 20) was rolled on the d20.
        3. Rolls Until 20 – This will output how many rolls it took before the first 20 was rolled.
        4. Longest Repeat Streak – This will output the highest number of times the same value was consecutively generated. It will also tell which dice rolls that streak occurred over.
   5. Toggle Show Dice Rolls – This is a toggled feature that will either show the values entered into the array as they are generated if it is turned on. If it is disabled, the values will not be shown when option 1 is chosen.

Menu

D20 Program Menu

1 - Roll Dice

2 - Show Roll Range

3 - Show Specific Roll

4 - Show Statistics

5 - Toggle Show Dice Rolls (On)

0 - Quit

Option 1

How many times will you roll the dice?

8

Roll # 0 = 16

Roll # 1 = 6

Roll # 2 = 1

Roll # 3 = 14

Roll # 4 = 14

Roll # 5 = 20

Roll # 6 = 4

Roll # 7 = 3

OR

How many times will you roll the dice?

8

Option 2

What range of dice rolls do you want to see? (Enter same number twice to see all rolls)

4 2

Roll # 2 = 1

Roll # 3 = 14

Roll # 4 = 14

What range of dice rolls do you want to see? (Enter same number twice to see all rolls)

1 1

Roll # 0 = 16

Roll # 1 = 6

Roll # 2 = 1

Roll # 3 = 14

Roll # 4 = 14

Roll # 5 = 20

Roll # 6 = 4

Roll # 7 = 3

What range of dice rolls do you want to see? (Enter same number twice to see all rolls)

-2 14

Invalid index entered

Option 3

Which die roll do you want to see?

52

Invalid index entered

Which die roll do you want to see?

5

Roll # 5 = 20

Option 4

##### AVERAGE ######

Average roll is 8.25

##### FREQUENCIES ######

1 was rolled 1 time(s) 2 was rolled 1 time(s)

3 was rolled 1 time(s) 4 was rolled 1 time(s)

5 was rolled 0 time(s) 6 was rolled 1 time(s)

7 was rolled 0 time(s) 8 was rolled 0 time(s)

9 was rolled 0 time(s) 10 was rolled 0 time(s)

11 was rolled 0 time(s) 12 was rolled 0 time(s)

13 was rolled 0 time(s) 14 was rolled 2 time(s)

15 was rolled 0 time(s) 16 was rolled 1 time(s)

17 was rolled 0 time(s) 18 was rolled 0 time(s)

19 was rolled 0 time(s) 20 was rolled 1 time(s)

##### ROLLS UNTIL 20 ######

The first 20 was rolled and stored at index 5

##### Longest Repeat Streak ######

Longest streak is 2 and starts at index 3

Option 5 simply says “Good bye”!

**Details**

* Make sure frequencies are shown 2 per line as seen above.
* Make sure your range works even if they put the ending index before the start index
* Don’t worry about adjusting the index. Consider roll 0 the first roll.
* The menu should be redisplayed after each menu choice. (Use a while loop)