Lab 10

**Rules:**

* Always create a separate Java file for each program you write in the lab (e.g., problem1.java, problem2.java, etc.)
* Do not forget to take your work with you when you leave the lab by either copying your work files to your own USB flash disk, or by e-mailing them to yourselves.

1. Write a Java program that does the following:
2. Create a Java file with the name **problem1.java**.
3. Prompt the user for a positive integer greater than or equal to 10, validating the input until the user enters a positive integer greater than or equal to 10.
4. Print a random integer between 1 and the user's integer. Use **Math.random()** method, which returns a random double value between [0, 1), i.e., 0 inclusive, 1 not inclusive.

Sample run of the program:

Enter an integer greater than or equal to 10: 7

Invalid input! Try again: 11

Random integer between 1 and 11 is 9.

1. Write a Java program that does the following:
2. Create a Java file with the name **problem2.java**.
3. Prompt the user for two positive integers, where the difference between the two integers must be at least 10, validating the input until the user enters two positive integers whose difference is at least 10.
4. Print a random integer from the range of the smaller integer to the larger integer.

Sample run of the program:

Enter two positive integers with a difference of at least 10: -1 15

Invalid input! Try again: 5 9

Invalid input! Try again: 15 39

Random integer between 15 and 39 is 23.

1. Write a Java program that does the following:
2. Create a Java file with the name **problem3.java**.
3. Prompt the user for a positive integer, which is the number of die rolls simulated, printing **Not playing games.** and terminating the program if the user enters an invalid integer.
4. Use a loop to simulate n die rolls, where for each die roll, print the roll number and the simulated die roll value.
5. After the last die roll, print the total count of ones rolled.

Sample run of the program:

Enter the number of die rolls: 5

Roll 1: 2

Roll 2: 3

Roll 3: 6

Roll 4: 1

Roll 5: 2

Total number of ones rolled: 1.

1. Write a Java program that does the following:
2. Create a Java file with the name **problem4.java**.
3. Randomly generate an integer n from the range 1 to 100.
4. Prompt the user to guess the integer.
5. After each guess, the program gives a hint:

* If the guess is larger than n, then the program prints **Too big.**
* If the guess is smaller than n, then the program prints **Too small.**

1. If the user didn’t guess the integer n, then prompt the user to guess again.
2. The program keeps track of the number of guesses.
3. When the user's guess is correct, then print **Congratulations! You took g guesses.** where g is the number of guesses.

Sample run of the program:

Guess the integer I'm picked from the range 1 to 100:

50

Too big.

40

Too small.

45

Too big.

43

Too small.

44

Congratulations! You took 5 guesses.

1. Write a Java program that does the following:
2. Create a Java file with the name **problem5.java**.
3. Simulate repeated coin tosses with a penny.
4. Simulate each penny toss by randomly generating a 0 or 1, with 0 representing heads and 1 representing tails.
5. Keep a count of the numbers of 0's and 1's generated per set of simulations.
6. Divide the resulting counts by the total number of simulated tosses to compute the relative frequency of each possible result.
7. Perform the above simulation for each of the following total number of simulated tosses:

10, 100, 1000, and 10000.

Sample run of the program:

Probability of heads given 10 tosses = 0.6

Probability of tails given 10 tosses = 0.4

Probability of heads given 100 tosses = 0.53

Probability of tails given 100 tosses = 0.47

Probability of heads given 1000 tosses = 0.484

Probability of tails given 1000 tosses = 0.516

Probability of heads given 10000 tosses = 0.4974

Probability of tails given 10000 tosses = 0.5026

Lab Work Submission:

* You can continue to work on this lab after our lab class, on your own, at home.
* Submit your lab work via Blackboard on or before: **Wednesday, October 4, 2023, 11:59pm**.
* The only accepted submission method!
* Once you submit your assignment you will not be able to resubmit it!
* Make absolutely sure the Java files you want to submit are the Java files you want graded.
* You will not be able to submit your lab work under any circumstances once **Lab10** disappears at **12:00 a.m.** on **Thursday, October 5, 2023**.
* There will be **NO** exceptions to these rules!
* To submit your lab work, upload the 5 Java files (**with .java extension**) you did for this lab to the **Lab10** assignment in the **Labs** tab in your Lab section’s presence in Blackboard.
* Then, make sure you click the **Submit** button to submit your lab work.