

COMP 1405/1005 -- Assignment #3

Due: Thursday, February 26, 2015 at 9:00 PM

[out of 45 marks]

Learning Objectives

- write programs that use simple `while` and `for` loops

Instructions:

1. Problem #1: [15 marks]

Write a program in Java that prompts the user for a line of input as a string. Then, using a **separate for loop** for each exercise below, the program prints the following:

- only the upper case letters in the string
- every second letter of the string
- the string, with all vowels replaced by an asterisk
- the number of vowels in the string
- the positions of all vowels in the string

2. Problem #2: [15 marks]

Write a program in Java that simulates a race between a tortoise and a hare. Each runner begins at position 0 on the race track and advances a random number of steps (between 0 and 5) at each turn. The first runner to reach position 100 wins. Your program will print the positions of the tortoise and the hare after each turn, and it will declare who wins the race at the end.

You can use the `Random` class to generate random numbers as follows:

- import the `java.util.Random` library
- create a random number generator object: `Random rng = new Random();`
- generate a random number between 0 and MAX: `int randNum = rng.nextInt(MAX);`

Your program must use a **while loop**.

3. Problem #3: [15 marks]

Write a Java program that controls access to a popular new restaurant. The restaurant is not allowed to have more than 100 people in it at any time. Groups of people can always leave, but a group cannot enter if they would make the total number of occupants in the restaurant exceed the maximum. Your program will repeatedly prompt the user for the size of the next group arriving or departing the restaurant. You can use negative numbers to represent departures. After each number is read from the user, display the current number of occupants. As soon as the restaurant reaches the maximum number of occupants, report to the user that the restaurant is full and end the program.

Your program must use a **while loop**.

Submission

You will submit in [cuLearn](#), before the due date and time, one `.java` file for each problem.

Do not submit `.class` files!

Grading

The detailed rubric can be found in [cuLearn](#). Each problem will be graded based on three criteria:

- quality of your problem solving logic
- quality of your program implementation
- adherence to programming conventions