

# CS 570: Programming Foundations

## Fall 2017

### Homework Assignment #3

**Due date: Wednesday, October 18, 2017 by 11:59 PM.**

#### **Writing, compiling and running your programs from Eclipse.**

In this assignment we will practice compiling and running our programs on Eclipse like we did in class. Here is a tutorial that will walk you to the steps of creating, compiling and running a program:

<http://www.vogella.com/tutorials/Eclipse/article.html#create-your-first-java-program>

Practice creating, compiling and running small program before you tackle the program given for this assignment.

#### **Program 1 (50 points):**

Write an "are you a fan" quiz program. The program will quiz the user on a topic of your choosing (keep the topic appropriate). For quiz ideas, check out this website (<http://www.allthetests.com/fan-quizzes-tests-Fantests.php>)  
Note: Please cite all sources you use in your code, in the form of a comment.

Your quiz must contain 10 questions. These 10 questions include at least two of each of the following different types of questions:

**Numeric Response:** The user enters in a numeric response to an open-ended question. I recommend prompting the user to enter an integer. If you choose to use floats, be specific to the user about how they should enter their response (i.e. rounded and/or a certain number of decimal places).

Example:

*How many states are there in the United States? Please enter an integer.*

**Multiple choice.** The user enters in a character 'a' through 'e' for their answer.

Example:

*What is the rough estimate of the population of New York City? Please enter a character a – e.*

- a) 1 million*
- b) 3 million*
- c) 5 million*
- d) 8 million*
- e) 10 million*

**True/False (Boolean):** The user enters True or False in response to a statement.

Example:

*Alaska was the last state to enter the Union, true or false? Please enter True or False.*

After the user enters an answer, the program should tell the user if the answer was correct or not. If the user's answer was incorrect, then show the right answer. For each correct answer, the user earns 1 point.

At the end of the quiz, tell the user their final score, plus a fun statement about how much of a "fan" they are of the quiz's topic (use an `if else if else` structure, which means you need at least 3 different fun statements based on the user's score).

Here is a sample run:

Welcome to the Harry Potter quiz! This quiz will assess if you are a true fan of the Harry Potter series

1. What was the name of Mr. Crouch's house elf? Please enter a letter.

- a. Winky
- b. Blinky
- c. Kreacher
- d. Dobby
- e. Slinky

Your answer: a

Correct!

2. Who taught History of Magic? Please enter a letter.

- a. Professor Sinistra
- b. Professor Lupin
- c. Professor McGonagall
- d. Professor Binns
- e. Professor Flitwick

Your answer: d

Correct!

3. In which year (1-7) did Harry go on his first date with Cho Chang? Please enter an integer.

Your answer: 4

Sorry, wrong answer. The correct answer is 5.

4. True or False: Thestrals can only be seen by people who have witnessed death (type True or False)

Your answer: True

Correct!

5. What did Dumbledore leave to Ron in his will? Please enter a letter.

- a. The Tales of Beedle the Bard
- b. The golden snitch
- c. The Pensieve
- d. The Deluminator
- e. Fawkes the Phoenix

Your answer: d

Correct!

6. How old was Voldemort when he opened the Chamber of Secrets? Please enter an integer.

Your answer: 14

Sorry, wrong answer. The correct answer is 16.

7. The Dursleys lived at \_\_ Privet Drive. Please enter an integer to fill in the blank.

Your answer: 3

Sorry, wrong answer. The correct answer is 16.

8. True or False: Sirius Black was sorted into Slytherin house. (type True or False)

Your answer: False

Correct!

9. True or False: In their second year, Hermione drank Polyjuice Potion that gave her lasting rat-like features. (type True or False)

Your answer: False

Correct!

10. Who was the master of the Elder Wand prior to Harry? Please enter a letter.

- a. Albus Dumbledore
- b. Severus Snape
- c. Minerva McGonagall
- d. Lord Voldemort
- e. Draco Malfoy

Your answer: b

Sorry, wrong answer. The correct answer is e) Draco Malfoy

Your score is: 6

Pretty good, but your Harry Potter knowledge needs some work.

Thanks for taking the Harry Potter quiz!

## Program 2 (50 points):

For this part of the assignment, you will create two files: one that contains the definition of a `Robot` class and one that contains the `main` method and tests the `Robot` class. Here are the specifications:

Create a class `Robot` with two attributes, an integer recording its total distance traveled and a double with its current battery level. Your class should implement the following methods:

- A constructor that takes no arguments. It should set the distance to 0 and the battery level to 3.
- A method `charge`, which takes an integer and increases the battery level by this amount.
- A method `currentSpeed`, which takes no arguments and returns the robot's current speed. This is calculated by squaring its battery level and multiplying by 2. (Note that the easiest way to square a number on a computer is to multiply it by itself.)
- A method `moveForward`, which takes an integer `distance` giving the distance the robot, should move. This method increases the robot's total distance traveled and also multiplies the battery level by

$$\left(1 - \frac{distance}{distance + 1}\right)$$

- A method `estTimeHome`, which takes no arguments and returns the time the robot would take to retrace its steps at its current speed. Thus, the return value is the total distance it has traveled divided by the current speed (calculated as described above).

Test your `Robot` class by taking it through the following steps:

- Create a `Robot`.
- Get its current speed; the value should be 18.
- Have it move forward 9 units.
- Get its current speed; the value should now be slightly less than 0.18 (returned as 0.179999999...).

- Have it calculate its estimated time home; the value should be very slightly over 50.
- Charge it by 5 units.
- Get its current speed; the value should now be 56.18.

Display the numeric results with two decimal places.

Here is a sample run:

```
Testig the Robot class

myRobot current speed is 18
myRobot current speed now is 0.18
It should take this much time to get home: 50
myRobot current speed after charging is 56.18
```

**Note 1:** Please make sure to submit well-written programs for these programming tasks. Good identifier names, useful comments, indentation, and spacing will be some of the criteria that will be used when grading this assignment.

**Note 2:** This assignment can be and must be solved using **only** the materials that have been discussed in class. Do not look for alternative methods that have not been covered as part of this course.

## Grading

Criteria for Program 1	Points
Code Compiles Correctly – no compilation errors	15
Code runs properly on several tests and produces the correct results	10
Program Construction: all parts are there and logical flow is correct – input and output operations and the appropriate use of selection statements	15
User Interface: the program provides clear instructions for the user so he/she understands what the program does, what input need to be provided and what the output of the program means.	5
Code Style: good identifier names, named constants as needed, comments, indentation and spacing	5

<b>Criteria for Program 2</b>	<b>Points</b>
Code Compiles Correctly – no compilation errors	10
Code runs properly and produces the correct results	10
Program Construction: all parts are there and logical flow is correct	10
Class implementation is correct and has all the required components.	10
User Interface: the program provides clear instructions for the user so he/she understands what the program does, what the output of the program means.	5
Code Style: good identifier names, comments, indentation and spacing	5

## How to submit your assignment

- Assignments must be submitted via Blackboard Learn.
  - Please note that assignments submitted via email will not be accepted.
  - Late assignments will not be accepted. Your work must be uploaded and submitted by 11:59 PM on the date it's due.
- For this assignment you must submit your source code, that is your **.java** files:
  - For the fan quiz problem: submit the corresponding **.java** file.
  - For the Robot problem submit two **.java** files: one for the `Robot` class and one for your main method testing the `Robot` class.
  - Do not submit files in any other formats – if you do, your assignment will not be graded.

## Academic Honesty

You must be the sole original author of the solution you submit. You must compose all program and written material yourself. All material taken from outside sources must be appropriately cited.