CS 570: Programming Foundations
Fall 2017

Homework Assignment #2

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

Compiling and running your programs from the command-line.

In this assignment we will practice compiling and running our programs on the command-line. By now, you should have downloaded and installed the *Java Standard Edition Development Kit* (JDK) on your computer.

JDK does not provide an editor so you will need to type your programs in a text editor (for example NotePad in Windows or TextEdit in OS X). Once you have typed your code and saved your file with `.java` extension you will need to bring up and work in a Command Prompt (Windows), Terminal (OS X) or shell (Linux) window.

You will use the `javac` and `java` commands to compile and execute your programs, as we did in class.

Windows users
Here is a video tutorial that will walk you through the steps you need to follow: https://www.youtube.com/watch?v=vobqUcnHAM8

If you when you try to compile your program you get the error: "javac not recognized as internal or external command…..," that means that you need to edit the PATH environment variable. Here is a quick tutorial on how to do so: https://www.youtube.com/watch?v=paLQCfC3Ff8

Mac users
Here is a video tutorial that will walk you through the steps you need to follow: https://www.youtube.com/watch?v=hzQWs4O6G7A

Linux users
Here is a page that will walk you through the steps you need to follow: http://introcs.cs.princeton.edu/java/15inout/linux-cmd.html

Program 1 (50 points):

Popeye the Sailor wants to sail from Bluto's Marina to Whimpy's Hamburger Haven, where he will dine with his girlfriend Olive Oyl. The one-way distance for this trip is 18 Nautical Miles. Popeye wants to know how far that is in "regular miles." A Nautical Mile is equal 1.1508 regular miles. Popeye also wants to know how long it will take to travel this distance. Popeye's boat travels at a top speed of 5.8 Knots (Nautical Miles per hour) and an average speed of 4 Knots.

Write a program to answer Popeye's questions. In your program, you should have a variable for the distance in nautical miles set to 18, a variable for the top speed set to 5.8, and a variable for the average speed set to 4. Your program should compute and display the distance in regular miles, the estimated travel time in hours at top speed and the estimated travel time in hours at average speed.

Here is a sample run:

```
Travel time calculator
This program calculates the distance in miles from a distance given in nautical miles.
The program also calculates the time it would take to travel the given distance at top speed and at average speed.

The distance to travel in nautical miles is: 18.0
The equivalent in regular miles is: 20.7144
The best case travel time is: 3.103448275862069 hours at 5.8 knots.
The average case travel time is: 4.5hours at 4.0 knots.
```

Program 2 (50 points):

Write a program that plays the following interactive “magician’s” game. Your program should prompt a player for a four-digit number and permute (scramble) the digits to form two numbers. For example, if a player enters 1267 then the two permutations might be 2176 and 7612. Your program should display these two numbers. Next, instruct the player to:

a. Calculate the positive difference between the two numbers,
b. Secretly choose any digit in the difference except a zero, and
c. Enter the remaining three digits in any order.

Your program will dazzle the player by supplying the secret digit.

Here is a sample run:

```
C:\Users\aalban\Documents\Adelaida\CS570\Homework\HW2>java MagicTrick
Magic Trick Program
Enter a four-doigit number: 1456
I have scrambled your number into two new numbers: 6541 and 4615
Now subtract the smaller from the larger, and secretly pick a non-zero digit from the difference.
Enter the other three digits of the difference:
1
9
2
The secret digit is 6
```

Hint: The sum of the digits in the difference must be a multiple of 9. Find the remainder when the sum of those three digits is divided by 9. That remainder plus the missing digit adds up to 9.

Note:

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.

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 arithmetic expressions	10
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	10

Criteria for Program 2	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 arithmetic expressions	10
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, comments, indentation and spacing	10

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:
    - Submit one **`.java`** file for each program you write.
    - 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.