

Computer Science, Claremont McKenna College

CS51.1 - Introduction to Computer Science, Spring 2015

Problem Set 2

Due: 11:55 PM, Feb 5, 2015

General Instructions

Please carefully read and follow the directions exactly for each problem. Files and classes should be named exactly as directed in the problem (including capitalization!) as this will help with grading.

You should create your programs using your preferred text-editor, the Eclipse text editor, or jGrasp. Do not use a word processor such as Microsoft Word, WordPad, Google Docs, Apple's Pages, etc...

Your programs should be formatted in a way that's readable. In other words, indent appropriately, use informative names for variables, etc... If you are uncertain about what is a readable style, look at the examples from class as a starting point for a reasonable coding style.

This problem set assumes you have installed Java and an IDE (Eclipse or jGrasp) on your system. Please see the course web page on Sakai for installation instructions.

Your programs should compile and run without errors. Please do not submit programs that do not compile! It's better to submit partial implementation that compiles as oppose to implementations that do not compile.

At the top of each file you submit, you should put your name and your email as comments.

This homework set should be submitted via Sakai using the Assignment Menu option (on the left pane). You should only submit the requested ".java" files. Do not submit ".class" files or Eclipse-specific project files. Finally, please do not submit files using Sakai's Dropbox Menu.

Turn in the following file(s):

- SphereVolume.java
- ConvertSeconds.java
- Fibonacci.java
- FactorialLoop.java

Problem 1

In this warmup problem, write a program in `SphereVolume.java` that calculates the volume of a sphere using a specified radius. Declare a variable named `radius` that's initialized to 4.3. Declare another variable named `volume`. Think about what type these variables should be. You should then calculate the volume and print an informative message. For example:

```
Volume of sphere of radius 4.3 is 333.03814281195156
```

Problem 2

In a file called `ConvertSeconds.java`, write a program that converts total seconds to an equivalent hours, minutes, and seconds. You are to do the following:

- Declare an int variable named `totalSeconds` and initialize it to 9431
- Declare int variables for hours, minutes, seconds
- First, determine the maximum number of hours that `totalSeconds` represents and save this number in the hours variable.
- There will be some number of seconds "leftover" from `totalSeconds` that are not accounted for by the maximum number of hours.
- Now, determine the maximum number of minutes that the "leftover" seconds represent and save this number in the minutes variable.
- There will be some number of seconds leftover from `totalSeconds` that are not accounted for by the maximum number of hours and minutes. Save this number in the seconds variable.
- Print out the resulting hours, minutes, and seconds in the following format (for example):

```
9431 seconds is equivalent to 2 hours 37 minutes 11 seconds
```

Problem 3

The Fibonacci numbers are sequence of integers where the first two elements are 1 and each succeeding elements is the sum of the previous two elements. Mathematically, the k^{th} element is defined as:

$$F(k) = F(k-1) + F(k-2) \quad \text{for } k > 2$$

where $F(1) = F(2) = 1$

In a file named `Fibonacci.java`, write a program that uses a for loop to produce the first 12 Fibonacci number which are: 1 1 2 3 5 8 13 21 34 55 89 144 .

Problem 4

Using nested for loops, write a program in `FactorialLoop.java` that calculates and then prints out the factorial of the numbers from 3 to 9 (inclusive). Print out the factorials in the following form:

```
3 factorial is equal to 6
4 factorial is equal to 24
etc...
```

Consider using a variable to track the intermediate “running” factorial result as the factorial is being calculated in a loop.