CSE 215L: Programming Language II Lab
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Lab 01 – Fall 2019

Objective:
After today's lab, the students should be able to:
- install Java and Eclipse
- know how to write, compile, and run a Java program
- perform simple I/O operations in Java
- write and calculate the result of simple mathematical expressions in Java

Preparing your system to develop programs in Java

Download link for JDK 13:
https://www.oracle.com/technetwork/java/javase/downloads/jdk13-downloads-5672538.html
Download link for Eclipse Photon: https://www.eclipse.org/downloads/

After going to these URLs, you have to select the correct version of these softwares based on your PC or laptop's configuration. Please note that you need to have any of the JDKs (after 1.6) installed into your PC or laptop, prior to your working with Eclipse or Netbeans IDE.

A simple Java program
The following program calculates the area of a circle where the radius is given by the programmer. Note that the name of your Java source file and the class name have to be the same.
Listing 2.1 ComputeArea.java

```java
public class ComputeArea{
   public static void main(String[] args){
      double radius;
      double area;
      radius = 20;
      //Compute area
      area = radius * radius * 3.14159;
      //Display results
      System.out.println("The area for the circle of radius " + radius +
         " is " + area);
   }
}
```

Now follow the similar format for Java and solve the following problems. Your experience of doing so should be similar to CSE115, where you have solved the similar problems using C. The problems that you cannot complete during class should be considered as homework before the next lab session and you can ask questions in the forum if you have any.

Task – 1
(Display three messages) Write a program that displays *Welcome to Java*, *Welcome to Computer Science*, and *Programming is fun*.

Task - 2
(Display five messages) Write a program that displays Welcome to Java five times.

Task – 3

(Area and perimeter of a circle) Write a program that displays the area and perimeter of a circle that has a radius of 5.5 using the following formula:

perimeter = 2 * radius * p
area = radius * radius * p

Task – 4

(Average speed in miles) Assume a runner runs 14 kilometers in 45 minutes and 30 seconds. Write a program that displays the average speed in miles per hour. (Note that 1 mile is 1.6 kilometers.)

Task – 5

(Convert Celsius to Fahrenheit) Write a program that reads a Celsius degree in a double value from the console, then converts it to Fahrenheit and displays the result. The formula for the conversion is as follows:

fahrenheit = (9 / 5) * celsius + 32

Here is a sample run:

Enter a degree in Celsius: 43
43 Celsius is 109.4 Fahrenheit

Task – 6

(Financial application: calculate tips) Write a program that reads the subtotal and the gratuity rate, then computes the gratuity and total. For example, if the user enters 10 for subtotal and 15% for gratuity rate, the program displays $1.5 as gratuity and $11.5 as total. Here is a sample run:

Enter the subtotal and a gratuity rate: 10 15
The gratuity is $1.5 and total is $11.5

Task – 7

(Science: calculating energy) Write a program that calculates the energy needed to heat water from an initial temperature to a final temperature. Your program should prompt the user to enter the amount of water in kilograms and the initial and final temperatures of the water. The formula to compute the energy is

Q = M * (finalTemperature – initialTemperature) * 4184

where M is the weight of water in kilograms, temperatures are in degrees Celsius, and energy Q is measured in joules. Here is a sample run:

Enter the amount of water in kilograms: 55.5
Enter the initial temperature: 3.5
Enter the final temperature: 10.5
The energy needed is 1625484.0

Task – 8

(Physics: finding runway length) Given an airplane's acceleration a and take-off speed v, you can compute the minimum runway length needed for an airplane to take off using the following formula:

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Write a program that prompts the user to enter v in meters/second (m/s) and the acceleration a in meters/second squared (m/s2), and displays the minimum runway length. Here is a sample run:

Enter speed and acceleration: 60 3.5
The minimum runway length for this airplane is 514.286

Task – 9

(Health application: computing BMI) Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters. Write a program that prompts the user to enter a weight in pounds and height in inches and displays the BMI.

Note that one pound is 0.45359237 kilograms and one inch is 0.0254 meters.

Here is a sample run:

```
Enter weight in pounds: 95.5
Enter height in inches: 50
BMI is 26.8573
```

Task – 10

(Print a table) Write a program that displays the following table. Cast floating point numbers into integers.

a	b	pow(a, b)
1	2	1
2	3	8
3	4	81
4	5	1024
5	6	15625