



North South University

Department of Electrical and Computer Engineering

CSE 215L: Programming Language II Lab

Lab Manual - 1

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Objective:

- To learn to set up the work environment
- To know running from Console I/O
- To familiarize with Datatypes, Operator, Expressions

Instructions:

1. To execute Java program, you need JRE (Java Runtime Environment) to be installed in your system.
2. To execute Java code, you need JDK (Java Development Kit) to be installed.
3. When you install JDK - JRE comes as bundled.
4. To write Java code, you can use any text editor like Notepad++, sublime text, Atom, Visual Code etc
5. Then you will need to compile the code from command prompt and execute it from there. That's where IDE (Integrated Development Environment) comes in handy. From an IDE you can write code, compile and execute it. For this course, I do not prefer IDE. If you want, you can. However I will check all tasks as well assignments through command prompt.

Data Types:

Data Type	Default Value	Default size
boolean	false	1 bit
char	'\u0000'	2 byte
byte	0	1 byte
short	0	2 byte
int	0	4 byte
long	0L	8 byte
float	0.0f	4 byte
double	0.0d	8 byte

Operators:

Operator Type	Category	Precedence
Unary	postfix	<i>expr</i> ++ <i>expr</i> --
	prefix	++ <i>expr</i> -- <i>expr</i> + <i>expr</i> - <i>expr</i> ~ !
Arithmetic	multiplicative	* / %
	additive	+ -
Shift	shift	<< >> >>>
Relational	comparison	< > <= >= instanceof
	equality	== !=
Bitwise	bitwise AND	&
	bitwise exclusive OR	^
	bitwise inclusive OR	
Logical	logical AND	&&
	logical OR	
Ternary	ternary	? :
Assignment	assignment	= += -= *= /= %= &= ^= = <<= >>= >>>=

The following program calculates the area of a circle where the radius is given by the programmer.

```
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

(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:

$$\begin{aligned}\text{perimeter} &= 2 * \text{radius} * \text{pi} \\ \text{area} &= \text{radius} * \text{radius} * \text{pi}\end{aligned}$$

Task – 2

(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 – 3

(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:

$$length = \frac{v^2}{2a}$$

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
```

Homework – 1

(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
```

Homework – 2

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
```

Homework – 3

(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
```