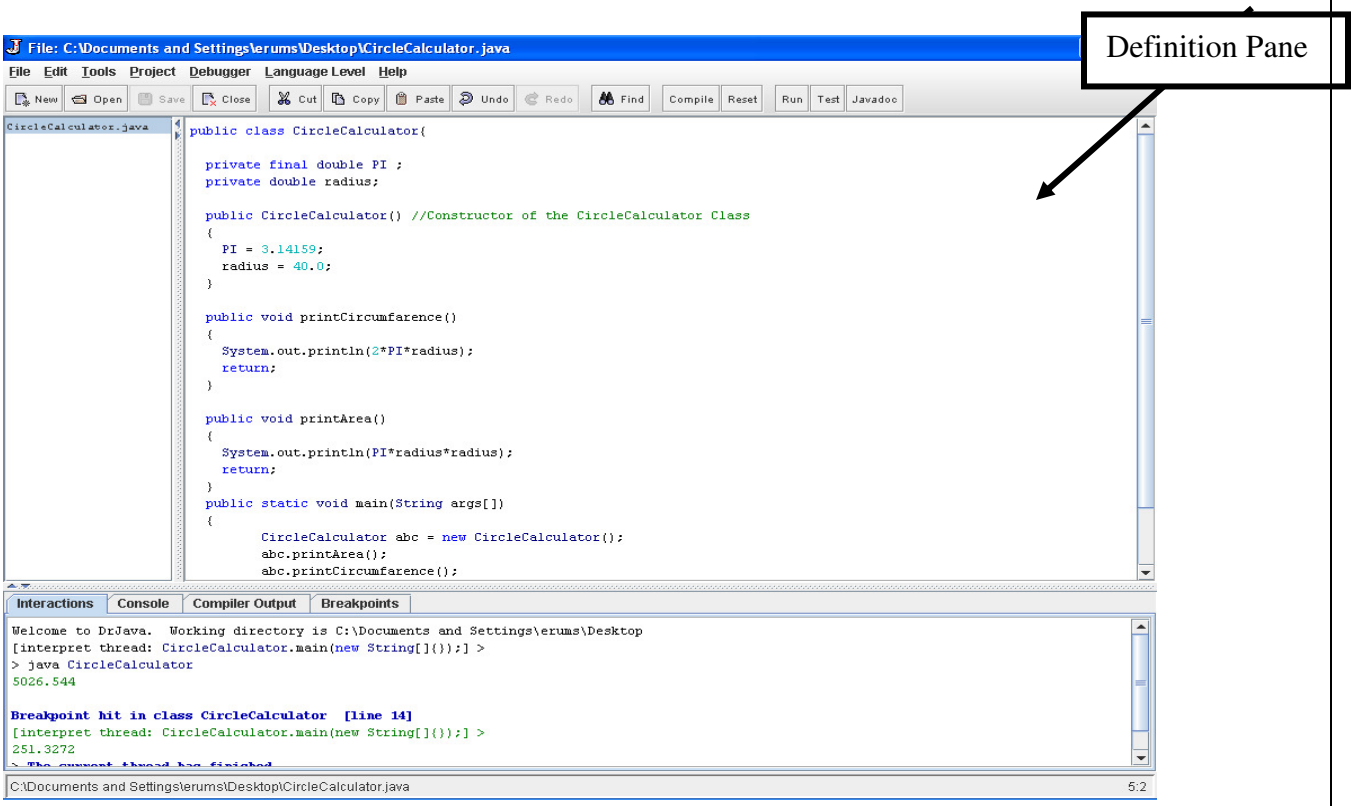
LAB5 - A Parameters

Objective

This lab focuses on the concept of "Functions with parameters and return types". All the assignments should be completed in this lab.

Variables should be initialized where they are declared and they should be declared in the smallest scope possible. A null initialization is acceptable. Variable names should be short yet meaningful. You must use Definition pane for implementing the following assignments.



Package Introduction

Java applications often comprise a very large number of classes. In order to provide for management of all these classes, they are arranged into groupings known as packages, with each package containing a logical group of related classes.

Existing Java Packages are available at the following link:
http://tns-www.lcs.mit.edu/manuals/java-api-old/packages.html

We are using java.lang in this lab. The class index of the java.lang package is available at the link:
http://tns-www.lcs.mit.edu/manuals/java-api-old/java.lang.html

To use any class of the package we have to first import that class. For instance, to import Math class from the Lang Package we will use the following code:
import java.lang.Math;

The class `Math` contains methods for performing basic numeric operations such as the elementary exponential, logarithm, square root, and trigonometric functions.
The index of methods and variable of java.lang.Math is available at the link
http://tns-www.lcs.mit.edu/manuals/java-api-old/java.lang.Math.html#_top_

Assignment Problems:

1- Write a class with the following functions:
   a- Function that returns a random number which lies in the range x to y. Where, x and y passed as parameters.

Hint:
Range of random [0,1)
Formula: (Math.random()*interval)+starting offset

   b- Function that returns the average (rounded off up to 2 decimal places) of a student who scored marks in the courses passed as parameters. Function the returns the solution of the quadratic equation: $2.7x^2 + 5.9x + 2.8$

Hint:
Calculate = $(b+\sqrt{b^2-4ac})/2a$

   c- Function the returns the Channel Capacity using the following formula:
   $C = B\log_2 M$
   Where, B (Bandwith) and M (Number of levels) are passed as parameters.
   d- Function that takes a parameter x is in degrees, calculate the cos, sin and tan function.
   e- Function that outputs the results of parts a, b, c and d in the console pane.

Hint:
Use java Maths library functions available where ever possible. For all parts of question 1 Where maths function are provided as follows
Library name: Java.lang.Math
functions:
sqrt(x)
pow(x,y)
sin(x)
cox(x)
tan(x)
radians(x)
degree(x)

exp(x)
Random(x)
Log(x)
Round(x)
Ciel(x)
Floor(x)
Abs(x)
Random()

2- Construct a class of Cylinder that has the following features:
   a- Calculate Area
   b- Calculate Volume
   c- Write a source class that sends the height and radius to the cylinder class and prints the returned values of area and volume of the cylinder

Hint:
Area of cylinder is $2pi*r^2+2*pi*rh$
Volume of the cylinder is $pi*r^2h$

Note: Use Accessor and Mutator functions properly

3- Write a function that displays a picture, made up of shapes from Wheels of a stereotypical alien. Compile, test, and run the program.
(Optional Question)

Hint:
Set the classpath to Wheels.zip
Explore and use from
http://www.cs.brown.edu/courses/cs015/docs/wheels/wheels/users/Shape.html

Program output: