**CMSC 155 Spring 2020**

**Exercise 3 (40 points available)**

**DUE: Midnight Thursday, Feb. 6**

Always hand in your code PLUS how you tested it and the results you obtained.

1. **Defining Methods**. Write and test a method that takes 3 single word Strings as formal parameters and **returns** the one that comes first alphabetically. (5 points)

package Week4;  
  
import java.util.Scanner;  
  
public class HW3 {  
  
 public static String letters(String str1, String str2, String str3) {  
 if (str1.compareTo(str2) <= 0 && str1.compareTo(str3) <= 0) {  
 return str1;  
 } else if (str2.compareTo(str1) <= 0 && str2.compareTo(str3) <= 0) {  
 return str2;  
 } else {  
 return str3;  
 }  
 }  
  
 public static void main(String[] args) {  
 Scanner input = new Scanner(System.*in*);  
 System.*out*.print("Enter an string: ");  
 String first = input.nextLine();  
 System.*out*.print("Enter an string: ");  
 String second = input.nextLine();  
 System.*out*.print("Enter an string: ");  
 String third = input.nextLine();  
 System.*out*.println(*letters*(first, second,third));  
 }  
}

Enter an string: hi my name is

Enter an string: justin

Enter an string: how are you

hi my name is

1. **User Input.** Write a function that repeatedly asks the user to enter an integer. This function has no formal parameters. When the user is done (you need to tell them how to indicate they are done), return out how many numbers were greater than 10 and less than 15. . (10 points)

package Week3;  
  
import java.util.Scanner;  
  
public class Parameters {  
  
 public static int countNumbers() {  
 Scanner input = new Scanner(System.*in*);  
 String in = "";  
  
 int count = 0;  
 System.*out*.println("Enter an int or q to quit: ");  
 in = input.next();  
  
 while (!in.equalsIgnoreCase("q")) {  
 int num = Integer.*parseInt*(in);  
 if (num >= 10 && num <= 15) {  
 count++;  
 }  
 System.*out*.println("Enter an int or q to quit: ");  
 in = input.next();  
 }  
 return count;  
 }  
  
 public static void main(String[] args) {  
 System.*out*.println(*countNumbers*());  
 }

Enter an int or q to quit:

5

Enter an int or q to quit:

10

Enter an int or q to quit:

11

Enter an int or q to quit:

12

Enter an int or q to quit:

13

Enter an int or q to quit:

14

Enter an int or q to quit:

15

Enter an int or q to quit:

q

6

1. **Type-Checking.**

Suppose func1 is defined as public static int func1(int x, String y)

and func2 is defined as public static String func2(String x, int y).

Suppose a is an initialized int variable and b is an initialized String variable in the main method.

State whether each of the following function calls is **valid** or **not valid**. For each one that is NOT valid, EXPLAIN why. For each one that IS valid, state what TYPE of value it returns. (5 points)

1. func1(2 \* a, a + b)
2. func2(a, b)
3. func2(func2(b, a), int a)
4. func1(b.length(), func2("Hi", 2.0 \* a))
5. func2(b + func1(5, b), func1(a, b) + func1(a/2, b))
6. func1(func1(a, b) + func1(func1(a, b), func2(b, a)))
7. Create and test a circle class that has one instance variable for the radius. (10 points)
   1. This method should have a constructor method, a method to calculate the area of the circle (πr2), and a toString method that returns the radius of the circle.

public class Circle {  
  
 //instance variables  
 private double radius;  
  
 //constructor  
 public Circle(double rad) {  
 this.radius = rad;  
 }  
  
 //other methods  
 public double calculateArea() {  
 return Math.*PI* \* radius \* radius;  
 }  
  
 //output method  
 public String toString() {  
 return "Circle with radius " + radius;  
 }  
  
}

1. Create a cylinder class (10 points)
   1. Create a constructor, toString method and a method to calculate the Volume of the cylinder (area of the base \* height). The class should two instance variables:
      * a circle object
      * Height

package Week3;  
  
public class Cylinder {  
  
 private double height;  
 private OOP base;  
  
  
 public Cylinder(OOP base, double hgt) {  
 this.base = base;  
 height = hgt;  
 }  
  
 public double cylinderVolume() {  
 return base.calculateArea() \* height;  
 }  
  
 public String toString() {  
 return "Cylinder with base " + base + " and height " + height;  
 }  
}

* 1. Write a class to test the circle and cylinder class.

package Week3;  
  
public class CircleTester {  
 public static void main(String[] args) {  
 OOP myCircle = new OOP(4);  
 System.*out*.println(myCircle);  
 System.*out*.println(myCircle.calculateArea());  
  
 Cylinder myCylinder = new Cylinder(myCircle, 2);  
 System.*out*.println(myCylinder);  
 System.*out*.println(myCylinder.cylinderVolume());  
 }  
}