CSC 142 – Exam I

Name: ___________________________________________________  Date: _______________

Please leave the following grading summary blank.

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1. Give the header of the method that must appear in every Java application.

2. The class **Pixel** has a single constructor that takes three **int** parameters. Like java.awt.Color, the parameter values are the red, green, and blue components and range between 0 and 255, inclusive. The **Pixel** class has a parameterless method named **grayScale** that returns a **double** value. Create an instance of **Pixel** and call the method **grayScale**. Store the value returned in the variable **grayValue** declared below. (For extra credit, create the pixel with the color rose (red on 100%, green on 40%, blue on 80%).)

   ```java
   double grayValue;
   ```

3. When you compile Java ____________________, you get ____________________ that runs in the _________________. The file extension of the **input** to the compiler is ________________; the file extension of the **output** of the compiler is ________________.

4. Explain what **method overriding** is. Give an example.

5. Write a Java method that will return the volume of a sphere. The radius of the sphere is given as the parameter to the method.

   \[
   volume = \frac{4}{3} \pi \cdot r^3
   \]
6. The following source code has several errors in it. Circle each error. For each error, describe the source of the error and how to fix it. Notes: Comments are part of the code. There is a penalty for circling things that are not errors. If there is one error and you make four changes to fix it, it still only counts as one error.

```java
/**
 * This is the Midterm class. It has several errors.
 * @author Dan
 * @version Summer 2015
 */
import java.awt.Color;

public class Midterm {
   // The data for the Midterm class.
   private Color theValue;

   /**
    * This makes an Midterm instance.
    * @return c The value for the instance variable.
    */
   public midterm(Color color) {
      theValue = color;
   }

   /**
    * This makes an Midterm instance.
    * @return The clone of the Midterm instance.
    */
   public Midterm makeMidterm() {
      Midterm clone = new Midterm();
      return Midterm clone = new Midterm();
   }

   /**
    * Retrieves the value of the instance variable.
    * @return The current color value
    */
   public Color getColor() {
      return color;
   }
}
```
7. Which of the following is the Java keyword associated with the methods not returning a value?
   a) sub
   b) void
   c) empty
   d) null

8. Which of the following is the Java keyword associated with reference variables not accessing an instance?
   a) void
   b) empty
   c) null
   d) This is not possible in Java.

9. Which of the following is the Java keyword associated with the current instance?
   a) this
   b) me
   c) current
   d) bound

10. Which of the following is the Java keyword associated with the base class?
    a) base
    b) parent
    c) home
    d) super

11. Which of the following is the Java keyword associated with instantiation?
    a) make
    b) new
    c) create
    d) void

12. Briefly define the terms Is-A and Has-A. How are these terms used in programming? Also give an example of each relationship.

13. Compare and contrast method overloading and method overriding. (Describe how they are similar, and how they are different. Examples may be helpful, but are not needed.)

14. Briefly describe the difference between calling a constructor and calling a method.