

CS 312 – Midterm 1 – Spring 2013

Your Name _____

Your UTEID _____

Circle your TAs Name: VICKY LUIS

| Problem Number | Topic | Points Possible | Points Off |
|-------------------|------------------|-----------------|------------|
| 1 | Expressions | 11 | |
| 2 | Loop Evaluation | 6 | |
| 3 | Method Tracing | 10 | |
| 4 | Method Tracing | 3 | |
| 5 | Writing Methods | 5 | |
| 6 | Tracing Graphics | 5 | |
| 7 | Programming | 10 | |
| 8 | Using Graphics | 10 | |
| TOTAL POINTS OFF: | | | |
| SCORE OUT OF 60: | | | |

Instructions:

1. Please turn off your cell phones
2. There are 8 questions on this test.
3. You have 50 minutes to complete the test.
4. You may not use a calculator.
5. Please make your answers legible.
6. When code is required, write Java code.
7. Style is not evaluated when grading.
8. The proctors will not answer questions.
9. The exam is worth 60 points. Grades will be scaled to 120 for gradebook.

1. Expressions. 1 point each, 11 points total. For each Java expression in the left hand column, indicate its value in the right hand column.

You must show a value of the appropriate type. For example, 7.0 rather than 7 for a double and "7" instead of 7 for a String. Answers that do not indicate the data type correctly are wrong.

A. `12 + "CS" + "\" + 1 + "E"` _____

B. `82617 / 1000 % 10 + 3 * 10` _____

C. `1.5 + 6 / 4 + 2.5` _____

D. `117 % 100 + 2 * 100 * 3 % 50` _____

E. `29 / 4 / 2.0 + 18 / 5 + 1.5` _____

F. `"UT" + "POP" + 3 * 5` _____

G. `3 * 2 + "C++" + 2 + 1` _____

H. `3 + 4 / (((double) 2) / 20)` _____

I. `1.5 * 3 / 2 + 2 * 3` _____

J. The three Math methods(`ceil`, `floor`, and `abs`) in the next expression all return doubles.

`Math.ceil(1.02) + Math.floor(2.4) + Math.abs(-1.5)` _____

K. `((int) 15.6) * 3 + 2 * 3` _____

2. Loops Simulation. 6 points total, 2 points each. Consider the following method:

```
public static void loop(int m, int p) {  
    final int LIMIT = m * p;  
    int temp = 0;  
    for(int i = 1; i <= LIMIT; i++) {  
        temp++;  
        temp += m;  
        p += 2;  
    }  
    System.out.print(m + " " + p + " " + temp);  
}
```

What is printed out by the following method calls?

Method Call

Output to screen

`loop(-1, 3);`

`loop(1, 4);`

`loop(-2, -2);`

3. Method Tracing and Parameters Simulation. (10 points) Consider the following program:

```
public class ParameterQuestion {

    public static void main(String[] args) {
        int a = 3;
        int b = first(a);
        System.out.println("A: " + a + " " + b);

        int x = 2;
        int y = 3;
        int z = second(x, y);
        System.out.println("B: " +x+ " " +y+ " " + z);

        a = third(-2, 3);
        System.out.println("C: " + a);

        a = 4;
        b = a / 2;
        int c = fourth(a, b);
        System.out.println("D: " +a+ " " +b+ " " + c);
    }

    public static int first(int a) {
        a += 2;
        return a * 2;
    }

    public static int second(int a, int b) {
        a = first(a);
        b = first(b);
        return a + b;
    }

    public static int third(int a, int b) {
        int temp = a;
        a = b;
        b = temp;
        System.out.println("E: " + a + " " + b);
        return a;
    }

    public static int fourth(int a, int b) {
        int y = second(b, a);
        return y - b;
    }
}
```

List output of program here:

In the box to the above list the output produced when the program runs.

List the output in the order it will appear on the screen when the program runs.

4. Method Tracing. 3 points. What is output when the following program is run?

```
public class MethodTrace {  
  
    public static void main(String[] args) {  
  
        int x = 5;  
        int y = 10;  
        System.out.println( toy(x) + " " + x + " " + toy(y));  
    }  
  
    public static int toy(int x) {  
        x = x * x;  
        System.out.print(x);  
        return x;  
    }  
}
```

OUTPUT:

5. (5 points) Write a method that calculates and returns a student's GPA given the number of A's, B's, C's, D's, and F's the student has earned in classes. The number of each letter grade earned (A, B, C, D, and F) are sent as parameters to the method. Assume every class the student takes is worth 3 credits. A's are worth 4 grade points, B's are worth 3 grade points, C's are worth 2 grade points, D's are worth 1 grade point, and F's are worth 0 grade points.

For example, given a student with 3 A's, 4 B's, 1 C, 0 D's, and 2 F's the method returns a GPA of 2.6.

6. Tracing Graphics Programs. 5 points. Sketch the drawing panel window that is produced when the following program when is run. Do not draw the title bar.

```
import java.awt.*;

public class Draw {

    public static final int SIZE = 400;

    public static void main(String[] args) {
        DrawingPanel p = new DrawingPanel(SIZE, SIZE);
        Graphics g = p.getGraphics();
        int part = SIZE / 4;

        // parameters on drawRect and fillOval are x, y, width, height

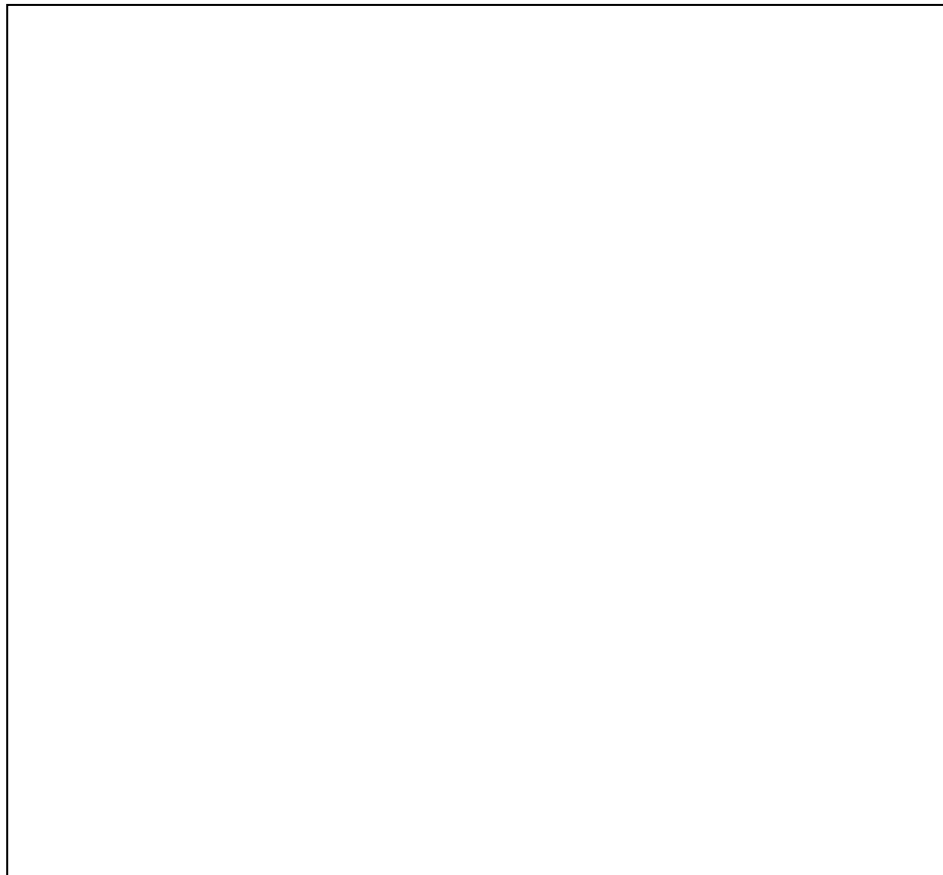
        g.drawRect(part, 0, part, SIZE);
        g.drawRect(0, part, SIZE, part);

        g.setColor(Color.RED);
        g.fillOval(part, part, SIZE / 2, SIZE / 2);
    }
}
```

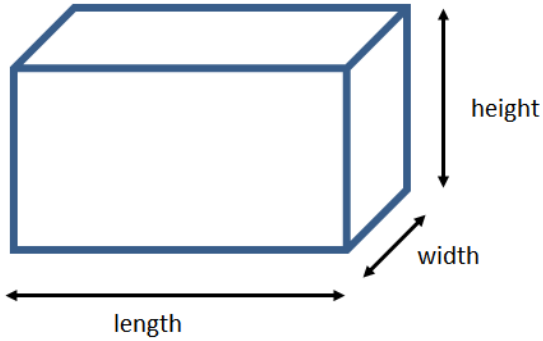
Sketch the
DrawingPanel
produced by the
program in the
box to the right.

Indicate the color
with a label if it
is not black.

Recall the origin
is at the top left
corner and y
increases down
the panel, not up.



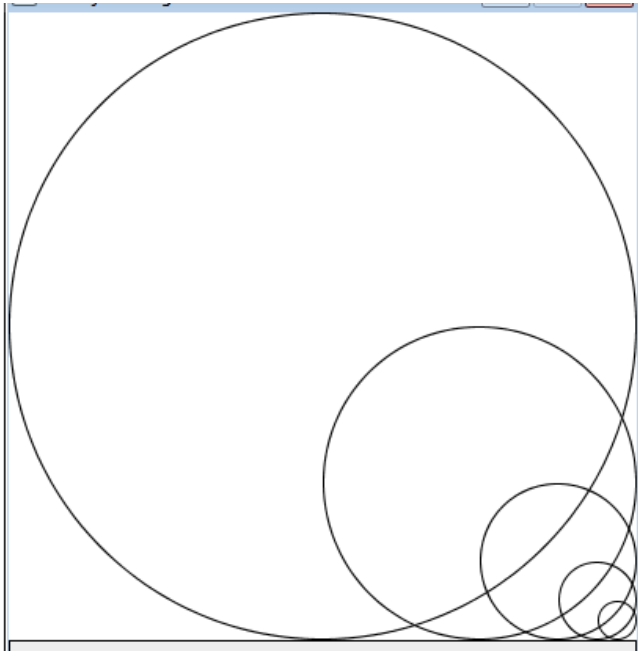
7. Programming. 10 points. Write a method that prints out the volume of a box for various values of length, width, and height.



The method shall have 3 parameters for the maximum length, width, and height. Print out all volumes of the box as the length, width, and height, vary from 1 to the maximum value. For example, given a maximum length of 2, a maximum width of 3, and a maximum height of 2 your method shall produce the following output:

```
LEN: 1 WID: 1 HT: 1 VOL: 1
LEN: 1 WID: 1 HT: 2 VOL: 2
LEN: 1 WID: 2 HT: 1 VOL: 2
LEN: 1 WID: 2 HT: 2 VOL: 4
LEN: 1 WID: 3 HT: 1 VOL: 3
LEN: 1 WID: 3 HT: 2 VOL: 6
LEN: 2 WID: 1 HT: 1 VOL: 2
LEN: 2 WID: 1 HT: 2 VOL: 4
LEN: 2 WID: 2 HT: 1 VOL: 4
LEN: 2 WID: 2 HT: 2 VOL: 8
LEN: 2 WID: 3 HT: 1 VOL: 6
LEN: 2 WID: 3 HT: 2 VOL: 12
```

8. Graphics Programming. 10 Points. Complete a method to produce the following output. The `Graphics` object for the `DrawingPanel` is sent to the method as a parameter as well as the size of the `DrawingPanel`. Assume the `DrawingPanel` is square with length and width equal to the `size` parameter.



A given oval has the same width and height. (They are circles.)

The width and height of each successive circle is half of the previous circle.

Each successive circle is drawn in the lower right quadrant of the previous circle.

The method always draws 5 circles.

Assume the color of the `Graphics` object has already been set to `Color.BLACK`.