SI@UCF Java Course Test #1 Solutions June 15, 2018

1. (12 pts) Maleah wants to buy some chicken nuggets. She buys some 6-pack nuggets and some 9-pack nuggets. The prices <u>in dollars</u> of these packs are given in the incomplete code shown below. Complete the code so that the program asks the user how many of each pack were bought and prints out two pieces of information: the total cost of the purchase (assume no tax), and the price per nugget <u>in cents</u> paid for that particular purchase. (For example if she buys one of each pack, the total cost is \$7.98 and she gets 15 nuggets so the price per nugget for the purchase is \$7.98/15 = 53.2 cents.)

```
import java.util.*;
public class nuggets {
    final public static double SIX PACK COST = 3.49;
    final public static double NINE PACK COST = 4.49;
    public static void main(String[] args) {
        Scanner stdin = new Scanner(System.in);
        System.out.println("How many 6 packs?");
        // 1 pt
        int num6 = stdin.nextInt() ;
        System.out.println("How many 9 packs?");
        // 1 pt
        int num9 = stdin.nextInt() ;
        // 4 pts total, 3 pts RHS, 1 pt LHS
        double cost = SIX PACK COST*num6 + NINE PACK COST*num9;
        // 5 pts total, 4 pts RHS, 1 pt LHS
        double avg = (100 \times cost) / (6 \times num6 + 9 \times num9);
        // 1 pt
        System.out.println(cost+" "+avg);
    }
}
```

2. (8 pts) Consider the rather strange function shown below:

$$f(x, y) = \min(\sqrt{x^2 + y^2}, \sqrt[3]{x^2 y^2})$$

Assume that x and y are variables that already have established values. Write a segment of code that calculates the value of f(x, y) and prints this out to the screen using the methods from the Math class shown below:

```
// Returns the sqrt(x<sup>2</sup>+y<sup>2</sup>).
static double hypot(double x, double y)
// Returns the cube root of a.
static double cbrt(double a)
// Returns the smaller of a and b.
static double min(double a, double b)
```

Write the code segment below:

```
double res = Math.min(Math.hypot(x,y), Math.cbrt(x*x*y*y));
System.out.println(res);
// Grading - 2 pts hypot call, 2 pts cbrt call, 2 pts min call
// 2 ots printing
```

3. (4 pts) Complete the code segment below so that it converts the number of cents indicated by the variable totalcents into cents and dollars.

```
Scanner stdin = new Scanner(System.in);
System.out.println("How many cents to you have?");
int totalcents = stdin.nextInt();
int dollars = <u>totalcents/100</u>; // 2 pts
int cents = <u>totalcents%100</u>; // 2 pts
System.out.println("You have $"+dollars+"."+cents+".");
```

4. (5 pts) To get to skip on Senior Skip Day, you must be in 12th grade and have fewer than 5 absences for the year. Complete the code segment below so that it prints out whether or not you can skip on Senior Skip Day:

```
Scanner stdin = new Scanner(System.in);
System.out.println("What grade are you in?");
int grade = stdin.nextInt();
System.out.println("How many absences do you have?");
int gone = stdin.nextInt();
```

// 3 pts if statement, 1 pt each print.

```
if (grade == 12 && gone < 5)
    System.out.println("Woo hoo, you can skip!");
else
    System.out.println("Sorry, you can't skip.");</pre>
```

5. (12 pts) Zeke runs 2 miles on each of the first five days of the week and 5 miles on each of the last two days of the week. Complete the program below so that it asks Zeke how many days he will run and outputs the total number of miles he ran. You may assume he starts his sequence of days running at the beginning of the week. (For example, if he runs for 6 days, he will run a total of 15 miles. If he runs for 9 days, he'll run a total of 24 miles. In the first instance he ran 2 miles for five of the days and five miles one of the days.) For this solution, please use a loop that goes through each day and adds the appropriate number of miles for each day to an accumulator variable.

```
import java.util.*;
public class Zeke {
    final public static int REG RUN = 2;
    final public static int LONG RUN = 5;
    public static void main(String[] args) {
        Scanner stdin = new Scanner(System.in);
        System.out.println("How many days did you run?");
        int numdays = stdin.nextInt();
        // 3 pts
        for (int i=0; i<numdays; i++) {</pre>
          // 4 pts if, 2 pts for each increment
          if (i \%7 < 5)
               res += REG RUN;
          else
               res += LONG RUN;
        }
        // 1 pt print
        System.out.println("You ran "+res+" miles total.");
    }
}
```

6. (10 pts) Now, attempt to solve the question above <u>without</u> a loop. (Only variable declarations, if statements and assignment statements are allowed!) Just write the added code below that would appear after the line int numdays = stdin.nextInt();

7. (15 pts) Complete the program below so that it asks the user to input an integer n and prints out the following triangle design:

```
1
2 1
3 2 1
...
n n-1 ... 1
```

}

You may assume n < 10. (Note: To get full credit, you must use a nested loop structure.)

```
import java.util.*;
public class Triangle {
    public static void main(String[] args) {
        Scanner stdin = new Scanner(System.in);
        System.out.println("Enter n.");
        int n = stdin.nextInt();
        // 4 pts
        for (int i=1; i<=n; i++) {</pre>
          // 5 pts
          for (int j=i; j>=1; j--)
               // 4 pts
               System.out.print(j+" ");
          // 2 pts
          System.out.println();
        }
    }
```

8. (12 pts) Just write a code segment in the draw function to create a bar graph with three bars right next to each other: a red bar, a green bar and a blue bar. Each bar should be 50 pixels wide. The red bar should be 100 pixels tall, the green bar should be 150 pixels tall, and the blue bar should be 200 pixels tall. Use the most intense red, green and blue, respectively. The Graphics class methods and Color class constants that are necessary are provided below. (Note: x is measured to the right and y is measured down.)

abstract void **fillRect**(int x, int y, int width, int height) Fills the specified rectangle.

abstract void setColor(Color c) Sets this graphics context's current color to the specified color. static Color RED The color red. static Color GREEN The color green. static Color BLUE The color blue. public void draw(Graphics g) { g.setColor(Color.WHITE); g.fillRect(0, 0, 500, 500); // 2 pts g.setColor(Color.RED); g.fillRect(100,300,50,100); // 2 pts q.setColor(Color.GREEN); // 2 pts // 2 pts g.fillRect(150,250,50,150); // 2 pts g.setColor(Color.BLUE); g.fillRect(200,200,50,200); // 2 pts

// Note to Grader: Starting point for red rectangle is arbitrary.
// Last to rectangles are fixed based on that. Grade accordingly.

}

9. (20 pts) Write a code segment in the draw function to create an 8 x 8 board of squares, each 50 pixels per side. If we label the squares on the first row 0 through 7 (going across), label the squares on the second row 8 through 15, etc. color the squares in this specified numeric order in the pattern red, green, blue. (So the first row would be RGBRGBRG. The second row would be BRGBRGBR. The third row would be GBRGBRGB, and so.)

```
final public static int SCRSIZE = 500;
final public static int SQSIZE = 50;
final public static int NUMSQ = 8;
final public static int OFFX = 45;
final public static int OFFY = 35;
public void draw(Graphics g) {
    q.setColor(this.backgroundColor);
    g.fillRect(0, 0, SCRSIZE, SCRSIZE);
    int cnt = 0;
    // 4 pts for each loop, many ways to do these.
    for (int y=0; y<NUMSQ; y++) {</pre>
        for (int x=0; x<NUMSQ; x++) {</pre>
            // 9 pts total for setting color based on cnt and this.
            if (cnt%3 == 0)
                g.setColor(Color.RED);
            else if (cnt%3 == 1)
                g.setColor(Color.GREEN);
            else
                g.setColor(Color.BLUE);
            // 3 pts for filling this rectangle.
            g.fillRect(OFFX+x*SQSIZE, OFFY+y*SQSIZE, SQSIZE, SQSIZE);
            cnt++;
        }
    }
}
```

10. (2 pts) What do the individual pieces of the cereal Cookie Crisp look like?

Cookies (Give to All)