

$$\begin{array}{r} 1R0 \\ 3 \overline{) 3} \\ \underline{-3} \\ 0 \end{array}$$

$$\begin{array}{r} 0R1 \\ 3 \overline{) 1} \\ \underline{-0} \\ 1 \end{array}$$

$$\begin{array}{r} 1R1 \\ 3 \overline{) 4} \\ \underline{-3} \\ 1 \end{array}$$

1. What is the result of the following operations in java? (1 point each)

5/2	=	2	404+ 555	=	959	4%3	=	1
5/2.0	=	2.5	"404"+555	=	"404555"	0%3	=	0
5.0/2	=	2.5	404+"555"	=	"404555"			
3%3	=	0	1%3	=	1			

$$\begin{array}{r} 0R0 \\ 3 \overline{) 0} \\ \underline{-0} \\ 0 \end{array}$$

2. In one or two sentences, describe the primary job of a constructor. (2 pts)

A constructor is used to instantiate new objects of a given class & is responsible for initializing instance fields.

3. After completing the code in problem 10, list all the accessor and mutator methods (if any) in the **RectangularPyramid** code. (2 pts)

Accessors: getHeight - accesses the height instance field

Mutators: setHeight - changes the height instance field

4. (2) Sometimes we refer to class methods and constructors as being overloaded. In one or two sentences, describe how you can identify them:

If two methods/constructors in the same class have the same name & different parameter lists, they are overloaded.

5. Given the following code, write the code that:
 a. uses the substring method to set g equal to the text "gram" (3 pts)
 b. sets e equal to the empty string (1 pt)
 c. prints the length of some string q (1 pt)

```
String p = "programming";
String g;
String e;
// set g equal to the substring "gram"
```

g = p.substring(3,7);

```
// set e equal to the empty string
```

e = "";

```
// print the length of q
```

System.out.println(q.length());

6. Evaluate the following statements & determine what the output would be. It is strongly encourage that you show your work to keep one wrong answer from propagating. (3 pts)

int a = 1;	a = 1
int b = 2;	b = 2
int c = 3;	c = 3
b++;	b=b+1 so b = 3
b = a + c;	b=1+3 so b = 4
a--;	a=a-1 so a = 0
c = a + b;	c=0+4 so c = 4
a--;	a=a-1 so a = -1
c++;	c=c+1 so s = 5

```
System.out.println(a);
System.out.println(b);
System.out.println(c);
```

prints out:
-1
4
5

7. Write the **RoachPopulation** class method **spray** such that it reduces the integer instance field named **roachCount** by 15%. Don't forget to add documentation commenting. (5 pts)

```
/** reduces roach count by 85%
 * /
public void spray()
{
    double temp = roachCount * 0.85;
    roachCount = (int) temp;
}
```

8. Convert the following formula into Java code (5 pts)

$$h = \frac{\pi}{2}g + \frac{x^y}{\sin x}$$

```
h = (Math.PI/2.0)*g + Math.pow(x,y)/Math.sin(x);
```

9. Write out the statement to create a constant in a class for the escape velocity of Mars and set it equal to 5.027. Observe proper naming conventions & select an appropriate data type. Note: you do not need to write out a class - only the single line of code to declare the constant. (2 pts)

```
public static final ESCAPE_VELOCITY = 5.027;
```

10. Provide the two methods & documentation comments as indicated in the comments below:

```
/**
 * describes a regular rectangular based pyramidal geometric solid
 * @author Pikalek
 * @version 0.01 - unfinished
 */
public class RectangularPyramid
{
    // instance fields
    double length;
    double depth;
    double height;

    public RectangularPyramid ();
    {
        length = 1.0;
        depth  = 1.0;
        height = 1.0;
    }
    public RectangularPyramid (l,d,h);
    {
        length = l;
        depth  = d;
        height = h;
    }
}
// 10.a. provide a method & documentation comments to get the height (2 pts)
```

```
/** get the current height
 *
 * @return height
 */
public double getHeight()
{
    return height;
}
```

```
// 10.b. provide a method & documentation comments to set the height (2 pts)
```

```
/** set the height to the given value
 *
 * @param h the value for the new height
 */
public void setHeight(double h)
{
    height = h;
}
```

```
}
```

11. Write a tester program that makes 2 objects of the **RectangularPyramid** class (one for each constructor). The tester should print the heights of both objects, change the height of one of them & print the new height. (10 pts)

```
public class Tester
{
    public static void main(String[] args)
    {
        RectangularPyramid p1 = new RectangularPyramid();
        RectangularPyramid p2 = new RectangularPyramid(2.0, 3.0, 4.0);

        System.out.println("p1 height: " + p1.getHeight() );
        System.out.println("p2 height: " + p2.getHeight() );

        p2.setHeight(8.5);

        System.out.println("p2 height: " + p2.getHeight() );

    }
}
```

note: comments are always a good idea, but weren't required for full points on this question

12. Extra Credit: list up to 5 points worth of content from chapters 1 through 4 that isn't addressed by any question in the exam. (5 pts)