

Total Score \_\_\_\_\_ Your work is to be done individually. The exam is worth 120 points (twenty points of extra credit are available throughout the exam) and it has 13 questions. Unless a question directly instructs you to correct a portion of code, there are **no known errors** within this document.

- [3 pts] What is your section number, the period your discussion meets, and the name of your discussion leader?
- [12 pts] What is the value of `d` after each statement executes? Also, what are the values of `a`, `b`, and `c` after all of the statements have executed? Note that the statements are sequential, the first possibly affecting the second, possibly affecting the third, and so on.

```
int a = 6, b = 2, c = 0, d = 5;
```

```
d = (a + b--) % d / 2;           d = 1
```

```
d = a * ++c - b;               d = 5
```

```
d -= a % 4 + b * ++c;         d = 1
```

```
All executions complete:  a = 6  b = 1  c = 2
```

- [6 pts] Given the variables `x` and `y` as well as their declarations, to what value do the following expressions evaluate?

```
int x = 5, y = 2;
```

```
x != 2 || y >= x               Evaluation = T
```

```
!(x == 3 && x - y == 0)        Evaluation = T
```

```
(y + x >= 5 && y != x)         Evaluation = T
```

- [6 pts] Declare a variable of the appropriate type, and assign it the result of the expression: `!(x < y && y != 0)`. Then use *one print* statement to print to the console (command prompt) the name of your new variable. In *another print* statement, print an equals sign and the value of your newly declared variable. Have both print statements display on the *same line* in the console.

```
boolean correct = !(x < y && y != 0);
System.out.print("correct");
System.out.print("=" + correct);
```

5. [8 pts] Using a total of *two print statements*, one print statement for each line given here, print both equations, followed by the  $d =$  and the resulting value of the equation. Format your print statement so that it looks exactly as the example given here. Note how  $d =$  is formatted to the right at the same level of indentation. Do not hard code the value for  $d$ , instead print the result of the executed equation.

```
d = (a + b--) % d / 2;           d = replace with equation result
d = a * ++c - b;               d = replace with equation result
```

```
System.out.println("d = (a+b--)%d/2;\t\td = "+ ((a+b--)%d/2));
```

```
System.out.println("d = a*++c-b;\t\td = "+ (a*++c-b));
```

6. [12 pts] Step through this series of statements and show the output produced. Also, state the final value of  $x$  and  $y$  after all the statements have executed.

```
int x = 5, y = 2, z = 8;           Output
if (x % y == 1) {
    y = x + 2;
    System.out.println("First");   First
}
else {                             Third
    y = --x * 2;
    System.out.println("Second"); Fourth
}
if (z / x <= 2) {
    x -= y;
    System.out.println("Third");
}
if (z != x && x != 0) {
    x = x / 2;
    y = y + 2;
    System.out.println("Fourth");
}

Final Values
x = -1 y = 9
```

7. [5 pts] State and describe the distinct results possible between integer and decimal division.

**Only integer/integer = integer, otherwise, decimal.**

8. [4 pts] Create the truth table of the logical OR operator:  $x \mid \mid y$ .

x	y	$x \mid \mid y$
T	T	T
T	F	T
F	T	T
F	F	F

9. [6 pts] Create the truth table of this logical statement:  $(x \ \&\& \ z) \mid \mid y$ .

X	Y	Z	$(X \ \&\& \ Z) \mid \mid Y$
F	F	F	F
F	F	T	F
F	T	F	T
F	T	T	T
T	F	F	F
T	F	T	T
T	T	F	T
T	T	T	T

10. [10 pts] Consider a class that models receipts received upon making a purchase. Declare this class. Use comments within the class describe properties of receipts. Finally, declare the properties you have proposed.

```
class Receipt
{
    //the time of this purchased, represented in day-month-year
    int day;
    String month;
    int year;
    String item; //the item purchased
}
```

11. [12 pts] Create a method *average*. The method will receive three decimal values, calculate the average of the three values, and return the result of the average.

```
public double average ( double a, double b, double c )
{
    return (a + b + c)/3;
}
```

12. [12 pts] Create a method *oddOrEven*. The method will receive an integer value and determine whether the value is even or odd. When the number is odd, print the number and “is odd”. When the number is even, print the number and “is even”.

```
public void oddOrEven ( int n )
{
    if( n % 2 == 0 ) {
        System.out.println( n + " is even.");
    }
    else {
        System.out.println( n + " is odd.");
    }
}
```

13. [24 pts] Create the class Gem. The class will represent different types of gems. It will contain two private properties, a String called *type*, the type of the gem and a double called *weight*, the weight of the gem. There are no methods in addition to those you should know to create.

```
class Gem
{
    private String type;
    private double weight;

    // constructors
    public Gem()
    {
        type = "diamond";
        weight = 1.0;
    }

    public Gem( String type, double weight )
    {
        this.type = type;
        this.weight = weight;
    }

    // get/set methods
    public String getType() {
        return type;
    }

    public void setType( String type ) {
        this.type = type;
    }

    public double getWeight() {
        return weight;
    }

    public void setWeight( double weight ) {
        this.weight = weight;
    }

    public String toString() {
        return "Type = " + type + "\nWeight = " + weight;
    }

    public void printInfo() {
        System.out.println( toString() );
    }
}
```