

[**May use one 8.5 × 11 inch sheet of paper for notes.**] Show all of your work clearly in the space provided or on the additional page at the end of the exam. **read each problem carefully.** Note that the exam is double sided.

**1.** (10 points) Precisely explain the difference between declaring a primitive and declaring a reference to an object. Give an example of each.

**2.** (10 points) Suppose that the variables `a`, `b`, and `c` are `booleans` and that `d` is a `double`. List all the combinations of values that will cause the following expression to evaluate to `false`. For the `double`, you can indicate the range of values in the form of something like: `d` must be greater than or equal to `17.3837`.

`(a || a) && (b || c) || 13 > d;`

**3.** (5 points) What will be displayed if the following line is run:

`System.out.println( 1 + 15 / 2 + 1.5 );`

4. (10 points) Why is a Java Virtual Machine (JVM) required in order to run a Java program?

5. (15 points) Suppose that a reference to a `String` called `phrase` exists and refers to a `String` with at least four characters. Write one or more lines of Java code that will display:

- The first half of the `String`, if it has an even number of characters in it.
- The second half of the `String` including the middle character, if it has an odd number of characters in it.

For example, `Friday` should produce `Fri` and `Tuesday` should produce `sday`.

6. (20 points) [Console input] Complete the following program that asks a user to enter a desired positive integer and then prints one line with the desired number of asterisks (separated by spaces). For example, if the user enters **3**, your program should print **\* \* \***. All input and output should be done in the console.

Determine the result of each of the following expressions:

```
import java.util.Scanner;
```

```
public class Exam {
```

```
    public static void main(String [] args) {
```

7. (15 points) [GUI Input] Complete the following program that asks the user to enter a floating point number and displays the square of the number. Input/Output should be handled with dialog boxes.

```
import javax.swing.JOptionPane;  
  
public class Exam {  
    public static void main(String [] args) {
```

8. (15 points) Rewrite the following `switch` statement with `if/else` statements such that it has identical behavior to the code shown.

```
switch (value) {  
  case 'a':  
    i = 3;  
    break;  
  case 'b':  
  case 'c':  
    i = 6;  
  case 'd':  
    j = 13;  
    break;  
  default:  
    i = 0;  
    j = 0;  
}
```



Additional space — indentify which problem your work is associated with.