

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. (5 points) Explain why a Java Virtual Machine (JVM) is required in order to run a Java program.

2. (5 points) Define a String literal and provide an example of one.

3. (10 points) Give an example of where typecasting is necessary.

4. (5 points) What does the compiler do?

5. (5 points) How do the `while` and `do-while` loop differ?

6. (10 points) Consider the following program:

```
public static void main(String [] args) {
    Scanner in = new Scanner(System.in);
    System.out.println("Please enter word.");
    String word = in.next();
    boolean count = 0;
    for(int i=0; i<word.length()-2; i=i+1) {
        if(word.charAt(i)=='o' && word.charAt(i+1)=='o') {
            ++count;
        }
    }
    System.out.println("Count: " + count);
}
```

What will be displayed if **Voodoo** is entered by the user? Explain.

7. (20 points) [GUI input] Complete the following code that asks the user to enter a phrase. Assume that the user enters one (and only one) space between each word in the phrase. Count the number of spaces in the phrase and display the number of words in the phrase. Input/Output should be handled with dialog boxes.

For example, if the user enters “**The dog is happy**”, the program should count three spaces and display “**4 words entered**”.

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

**8.** (20 points) [Console Input] Complete the following program that asks the user to enter an integer and displays a list of all the numbers between 10 and the number.

For example, if the user enters **12**, the program should display **10 11 12**.

Alternatively, if the user enters **5**, the program should display **5, 6, 7, 8, 9, 10**.

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

```
public class Exam {
```

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

9. (20 points) Given three `ints`, `a` `b` `c`, set `a` equal to `-72` if `b` is greater than `a`, and `c` is greater than `b`. However, if `b` is `3`, then `b` does not need to be greater than `a`.

```
public void question(int a, int b, int c) {
```

```
    System.out.println("a=" + a + " b=" + b + " c=" + c);  
}
```



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