Name: _____

Write all of your responses on these exam pages.

1 Short Answer (5 Points Each)

1. What is the difference between a compiler and an interpreter? Also, discuss Java's method.

2. Java is a "platform-independent language." What is a *platform*, what does *platform-independent* mean, and how does Java attain its platform independence?

3. What are the three types of programming errors? Briefly describe each of them.

4. What are reserved words? Give four examples of Java reserved words.

5. Write a single line of code that declares an integer variable `num1` and assigns to it a random integer between 15 and 27, inclusively.

6. Write a few lines of code that will take a string stored in `str1`, extract the first word and then convert that word to all uppercase characters and finally print the word out to the screen.

7. Answer the following questions about numeric data types in Java.

   (a) What happens when you overload an int?

   (b) What happens when you overload a double?

   (c) What happens when you underload an int?

   (d) What happens when you underload a double?

   (e) What happens when you input an integer when the Scanner is doing a nextDouble?

2 Program Traces (15 Points Each)

1. For each of the given inputs, write the output of the program.

```
1  import java.util.Scanner;
2
3  public class Exam01_Trace1 {
4
5      public static void main(String[] args) {
6          Scanner keyboard = new Scanner(System.in);
7          System.out.print("Input n: ");
8          int n = keyboard.nextInt();
9
10         while (n > 1) {
11             if (n % 2 == 0) {
12                 n = n / 2;
13             } else {
14                 n = 3 * n + 1;
15             }
16             System.out.print(n + " ");
17         }
18     }
19 }
```

(a) `Input n: 5`

(b) `Input n: 7`

(c) `Input n: 20`

2. For each of the given inputs, write the output of the program.

```
1  import java.util.Scanner;
2
3  public class Exam01_Trace2 {
4
5      public static void main(String[] args) {
6          Scanner keyboard = new Scanner(System.in);
7          System.out.print("Input str1: ");
8          String str1 = keyboard.nextLine();
9          System.out.print("Input str2: ");
10         String str2 = keyboard.nextLine();
11
12         int pos = str1.indexOf(str2);
13         System.out.println(pos);
14
15         if (pos <= 5) {
16             str1 = str1.replaceAll(str2, "HERE");
17             str2 = "Replaced All";
18         } else if (pos > 15) {
19             str2 = str1.replaceAll(" ", "");
20             str1 = str2.substring(str2.length() / 4, str2.length() / 2);
21         } else {
22             String tempstr = str1;
23             str1 = str2;
24             str2 = tempstr;
25         }
26
27         System.out.println(str1);
28         System.out.println(str2);
29     }
30 }
```

(a) `Input str1: This is a string for testing Exam 1 Trace 2.`
`Input str2: a`

(b) `Input str1: This is a string for testing Exam 1 Trace 2.`
`Input str2: for`

(c) `Input str1: This is a string for testing Exam 1 Trace 2.`
`Input str2: is`

3 Coding (15 Points Each)

1. Write a program that helps the cashier at a store count back change. The program should ask for the amount of money to give back in change for a purchase (for example, $5.47) and then output the number of dollars, quarters, dimes, nickels, and pennies. You do not need to go higher than a dollar bill in change but the program should handle amounts like $125.24. The output should always use the highest denomination possible, an output of 12524 pennies does not solve the problem. For example, for an input of $5.47, the program should output 5 ones, 1 quarter, 2 dimes and 2 pennies. For the input of $125.24, the program should output 125 ones, 2 dimes and 4 pennies.

```
import java.util.Scanner;

public class Exam01_1 {

    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);









    }
}
```

2. In a standard poker deck of cards, each card has a face value and a suit. The face values are A (Ace), 2, 3, 4, 5, 6, 7, 8, 9, 10, J (Jack), Q (Queen), K (King) and the suits are ♢ (Diamonds), ♡ (Hearts), ♣ (Clubs) and ♠ (Spades).

   Write a program that will "deal" one card at random and output the value of the card, using the name of the suit and the name of the face value as either Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, or King. Five runs of the program are listed below.

```
Card: 6 of Clubs
Card: Ace of Spades
Card: King of Clubs
Card: Queen of Clubs
Card: 10 of Diamonds
```

   Note that we started the program with the string variable `cardstr` set to the empty string and the final line does all of the output. Use conditional statements and string concatenation to transform `cardstr` into the final output string.

```
public class Exam01_2 {

    public static void main(String[] args) {
        String cardstr = "";









        System.out.println("Card: " + cardstr);
    }
}
```

3. The factorial of a positive integer n is defined to be $n! = n \cdot (n-1) \cdot (n-2) \cdots 2 \cdot 1$, also we define $0! = 1$. Write a program that will allow the user to input an integer n and then the program should output the value $n!$. If the user inputs a negative number the program should print out an error message saying that the input was invalid. Note that factorials are integers, not decimal numbers, your program should use the appropriate data type.

```
import java.util.Scanner;

public class Exam01_3 {

    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);









    }
}
```