

Write all of your responses on these exam pages. If you need extra space please use the backs of the pages.

1 Short Answer (5 Points Each)

1. What are the three types of programming errors? Briefly describe each of them.
2. Write a single line of code (not an entire program) that declares an integer variable `num1` and assigns to it a random integer between 25 and 53, inclusively.
3. Write a single line of code (not an entire program) that declares a double variable called `pi` and stores in it the value of $\frac{3\pi}{2}$.
4. What does ASCII stand for and what is it?

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

(a) What is overloading and underloading an integer?

(b) What happens when you overload an int?

(c) What happens when you underload an int?

(d) What happens when you input a non-numeric string when the Scanner is doing a nextInt?

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

6. Which of the following are valid variable names. If the variable name is invalid state why.

(a) Help

(b) 5items

(c) Variable 1

(d) iH4h__gT3glGygu1

(e) double

7. Write a few lines of code (not an entire program) that will take an input string from the user (an entire line of text) and printout the number of spaces in the string. You may assume that a Scanner object has been created with name kb. Hint: if you remove all the spaces in the string then the number of spaces in the original string will be the difference in the lengths of the original string and the string with the spaces removed.

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 Exam1Trace1 {
4
5      public static void main(String[] args) {
6          Scanner kb = new Scanner(System.in);
7          System.out.print("Input a number: ");
8          int a = kb.nextInt();
9          System.out.print("Input a number: ");
10         double b = kb.nextDouble();
11         System.out.print("Input a number: ");
12         int c = kb.nextInt();
13
14         if (a >= b) {
15             System.out.println("Block 1");
16             c = a / 2;
17             --a;
18             b = b + a;
19         } else if (b > c) {
20             System.out.println("Block 2");
21             c = a++ * c;
22             b = b / 2;
23         } else {
24             System.out.println("Block 3");
25             Math.pow(a, c);
26             b = --b - 1;
27             a = c;
28             c = a;
29         }
30
31         System.out.println(a + " " + b + " " + c);
32     }
33 }
```

-
- (a) Input a number: 3
Input a number: 5
Input a number: 9

-
- (b) Input a number: 1
Input a number: 7
Input a number: 2

-
- (c) Input a number: 15
Input a number: 12
Input a number: 4
-

2. For the given input, write the output of the program. For any spaces, including leading or trailing, use an under bracket to represent the space. For example, Hi There should be written as Hi_There_.

```
1 import java.util.Scanner;
2
3 public class Exam1Trace2 {
4
5     public static void main(String[] args) {
6         Scanner kb = new Scanner(System.in);
7         System.out.print("Input a string: ");
8         String s = kb.nextLine();
9         System.out.print("Input a string: ");
10        String t = kb.nextLine();
11        System.out.print("Input a string: ");
12        String r = kb.nextLine();
13
14        int pos = s.indexOf(r);
15        System.out.println(pos);
16        if (pos >= 0) {
17            t = t.substring(pos / 2) + s.substring(pos);
18            s = s.substring(0, pos);
19            r.toUpperCase();
20        } else {
21            pos = t.length() / 2;
22            t = t.substring(pos);
23        }
24
25        System.out.println(s);
26        System.out.println(t);
27        System.out.println(r);
28
29        System.out.println(s.endsWith(r));
30        System.out.println(t.indexOf("o"));
31
32        if (s.compareToIgnoreCase(t) > 0) {
33            System.out.println(s.charAt(1));
34        } else {
35            System.out.println(t.charAt(1));
36            System.out.println(r.charAt(1));
37        }
38    }
39 }
```

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- (a) Input a string: You_are_almost_done_with_Exam_1
Input a string: Must_feel_good
Input a string: most

-
- (b) Input a string: my_questions_can_be_tricky
Input a string: timezone
Input a string: ion

3 Coding (15 Points Each)

1. Write a program that will take as input the cost of the food bill at a restaurant. The state tax for the food is 6%, the restaurant has an additional restaurant tax that is 5% if the bill is under \$200. If the bill is \$200 or more then the restaurant does not include the restaurant tax. If the bill is under \$50 then the tip is 15% of the food cost, if the bill is \$50 up to but not including \$100 then the tip is 17.5% of the food cost, and if the bill is \$100 or more then the tip is 20% of the food cost. Have the program print out the food cost, the two taxes, tip, and total. The output of all the costs should have two decimal places and the decimal points should line up vertically, as in the three runs below. You may assume that the cost of any meal is less than \$500.

Bill = 45.23	Bill = 154.39	Bill = 237.90
Food Cost = 45.23	Food Cost = 154.39	Food Cost = 237.90
Tax = 2.71	Tax = 9.26	Tax = 14.27
Restaurant Tax = 2.26	Restaurant Tax = 7.72	Restaurant Tax = 0.00
Tip = 6.78	Tip = 30.88	Tip = 47.58
Total Cost = 56.99	Total Cost = 202.25	Total Cost = 299.75

```
import java.util.Scanner;

public class Exam01_1 {

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

```
    }
}
```

2. Write a program that will take in five numbers as input and print out the largest, smallest, and average of the numbers. Remember that the average is the sum of the numbers divided by the number of numbers.

Input five numbers: 2.7 9.8 12 1.7 4.2
Minimum = 1.7
Maximum = 12.0
Average = 6.08

```
import java.util.Scanner;

public class Exam01_2 {

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

```
    }
}
```

3. Write a program that will take an input string from the user (an entire line of text) and change the input string by interchanging the first word with the last word. Finally, it should print out the altered string. You may assume that the string has no leading or trailing spaces and that words are separated by a single space. Make sure that this program will also work if there is only one word in the input string.

Input a string: some stupid input string
string stupid input some

```
import java.util.Scanner;

public class Exam01_3 {

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

```
    }
}
```