

Name: \_\_\_\_\_

Write all of your responses on these exam pages.

## **1 Short Answer (5 Points Each)**

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

(a) soap\_box

(b) else

(c) String

(d) Book#1

(e) 5Golden\_Rings

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

3. 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?

4. What is the difference between a compiler and an interpreter? Also, discuss Java's method. In addition, explain why this makes Java a "platform-independent language."

5. What does ASCII stand for and what is it?

6. What are the three main career areas of computing and briefly describe each.
7. Write a single line of code that will generate a random integer between 15 and 37 and store it in a variable named `num1`.
8. Write a single line of code that will print out the ASCII value of a character variable `ch`.
9. Write a single line of code that will compute the volume of a sphere given the radius is stored in a variable named `r`. Recall that the volume of a sphere is calculated using the formula  $V = \frac{4}{3}\pi r^3$ .
10. Write a couple lines of code that will take the variable `x`, a double, and extract the portion to the left of the decimal and the fractional part of the number. For example, if `x` has the value 34.529 your code will store the 34 in another variable and the 0.529 in a third.

## 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 Exam01Trace01 {
4
5     public static void main(String[] args) {
6         Scanner keyboard = new Scanner(System.in);
7
8         System.out.print("Input x: ");
9         int x = keyboard.nextInt();
10        System.out.print("Input y: ");
11        int y = keyboard.nextInt();
12        System.out.print("Input z: ");
13        double z = keyboard.nextDouble();
14
15        double w = 1;
16        long t = 2;
17        int u = 3;
18        double r = 4;
19
20        if (x <= y && y < z) {
21            System.out.println("Block 1");
22            t = y % x;
23            u = ++y + x--;
24        } else if (y > z) {
25            System.out.println("Block 2");
26            w = x / y;
27            r = Math.pow(y, 2);
28        } else {
29            System.out.println("Block 3");
30            t = ++x * y--;
31            r = x / y;
32        }
33
34        System.out.println(x + " " + y + " " + z);
35        System.out.println(w + " " + t + " " + u + " " + r);
36    }
37 }
```

---

- (a) Input x: 3  
Input y: 7  
Input z: 11.5
- 

- (b) Input x: 7  
Input y: 3  
Input z: 9

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 Exam01Trace02 {
4
5     public static void main(String[] args) {
6         Scanner keyboard = new Scanner(System.in);
7
8         System.out.print("Input a string: ");
9         String str = keyboard.nextLine();
10
11         System.out.println(str.length());
12         System.out.println(str.charAt(10));
13         System.out.println(str.indexOf("a"));
14         System.out.println(str.indexOf("t", 17));
15         System.out.println(str.lastIndexOf("t", 17));
16
17         String str3 = str.substring(5, 13);
18         String str4 = str.substring(7);
19
20         System.out.println(str3);
21         System.out.println(str4);
22         System.out.println(str3.trim().toUpperCase());
23         System.out.println(str3);
24     }
25 }
```

---

Input a string: `That_evening_it_was_dark_early.`

### 3 Coding (15 Points Each)

1. Write a program that will take as input a decimal number representing the user's yearly taxable income and return the amount of income tax they must pay the government. Income tax is calculated as a percentage of the users income according to what bracket they fall in. Here is the tax scheme. If the person makes less than \$40,000 they pay 15% of their income in tax. If the person makes \$40,000 or more up to but not including \$65,000 they pay \$6,000 plus 20% of their income that exceeds \$40,000. If the person makes \$65,000 or more up to but not including \$100,000 they pay \$11,000 plus 25% of their income that exceeds \$65,000 in tax. If the person makes \$100,000 or more up to but not including \$200,000 they pay \$19,750 plus 27.5% of their income that exceeds \$100,000 in tax. If the person makes \$200,000 or more they pay \$47,250 plus 30% of their income that exceeds \$200,000 in tax. Three separate runs are below.

Input your income: 25254  
Your tax is: \$3788.10

Input your income: 62980  
Your tax is: \$10596.00

Input your income: 250000  
Your tax is: \$62250.00

---

```
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 two strings from the user, an initial string and a removal string. Each of these might be more than one word. The program should remove just the first and last occurrence of the removal string. If there is only one occurrence of the removal string it will remove it and if the removal string is not present then the program should output the original string. Three runs are below.

```
Input a string: ace so test so string so ace so help
Input a remove string: so
ace test so string so ace help
```

```
Input a string: ace so test so string so ace so help
Input a remove string: test
ace so so string so ace so help
```

```
Input a string: ace so test so string so ace so help
Input a remove string: Jack
ace so test so string so ace so help
```

---

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

```
public class Exam01_2 {
```

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

```
    }
}
```