

Computer Science 121

Lab 4

100 Points

In this lab, you have three questions. For all of the questions you will be using if statement or if-else statement or if-else if- else statement only.

You need to finish **question1 and 2** in the lab and demonstrate to your instructor. You need to submit **question 3** in ecampus before the next lab and you can demonstrate during the next lab.

Also include the following comment at the beginning of your code:

```
/*  
* Your Name  
* Submission Date  
* CS 121 Lab  
* Name of Program  
*  
* Describe what the program does in one to two sentences.  
*/
```

You also need to include comments throughout the program.

Q1. (20 Points)

Write a program named RandomMonths that randomly generates an integer between 1 and 12 and displays the English month names January, February,December for the generated numbers 1,2,....12 accordingly. For example: If the randomly generated number is 5, you need to print

The month is May.

Note: Here is the note from the book to find random numbers:

- Use Math.random() to obtain a random double value between 0.0 and 1.0 excluding 1.0
- Use (int) (Math.random () * 10) to return a random single-digit integer between 0 and 9
- To return a random single-digit integer between min and max use
int range = (max - min) + 1;
int randomNumber = (int)(Math.random() * range) + min;

Q2. (30 Points)

Write a program named SortNumbers that asks the user to enter three integers and display the integers in non-decreasing order. For example:

```
> run SortNumbers
Enter first integer: 7
Enter second integer: 100
Enter third integer: 1
The sorted numbers are 1 7 100
> |
```

You can follow the following pseudocode to solve this problem:

Declare integers temp, number1, number2, number3

Prompt user to enter first integer

Store user input to number1

Prompt user to enter second integer

Store user input to number2

Prompt user to enter third integer

Store user input to number3

if number1 is larger than number2

 store number1 to temp

 store number2 to number1

 store temp to number2

if number2 is larger than number3

 store number2 to temp

 store number3 to number2

 store temp to number3

if number1 is larger than number2

 store number1 to temp

 store number2 to number1

 store temp to number2

Print sorted numbers in order of number1, number2 and number3

Q3. (50 Points)

The two roots of a quadratic equation $ax^2 + bx + c = 0$ can be obtained using the following formula:

$$r_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ and } r_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Here, $b^2 - 4ac$ is called the discriminant of the quadratic equation. If it is positive, the equation has two real roots. If it is zero, the equation has one root. If it is negative, the equation has no real roots.

Write a program named QuadEquation that prompts the user to enter 3 integer values for a, b and c and display the result based on the discriminant.

If the discriminant is negative display “The equation has no real roots.”

If the discriminant is 0, display one root.

Otherwise, compute the two roots r_1 and r_2 using above formula and display them.

Note: You can use `Math.pow(x, 0.5)` to compute \sqrt{x} . Here are some example runs:

Example1

```
Enter the coefficients of a quadratic equation (enter only integer values) a, b, c:
```

```
1 3 1
```

```
The equation has two roots -0.3819660112501051 and -2.618033988749895
```

Example2

```
Enter the coefficients of a quadratic equation (enter only integer values) a, b, c:
```

```
1 2 1
```

```
The equation has one root -1.0
```

Example3

```
> run QuadEqn
```

```
Enter the coefficients of a quadratic equation (enter only integer values) a, b, c:
```

```
1 2 3
```

```
The equation has no real roots
```

Submitting your Code

When you are done, you will need to submit your code for both questions on eCampus. When logging onto eCampus, be sure to select your corresponding lab session instead of T01. When you actually submit your code, be sure to submit the .java file, not the .java~ or .class files.

Tentative Rubric:

Question		Max Points
1	proper comments	2
	Random number	5
	proper if else for 12 months	8
	execution	5
	Q1 total	20
2	proper comments	2
	input integers	5
	proper if conds	5
	execution	18
	Q2total	30
3	proper comments	2
	input double	5
	compute discriminant	5

	correct code for discriminant < 0	5
	correct code for discriminant == 0	10
	correct code for discriminant > 0	15
	execution	8
	Q3total	50
	Total	100