

**King Saud University**  
**College of Computer & Information Science**  
**CSC111 – Lab04**  
**Conditional Statements**  
**All Sections**

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**Objectives:**

- 1- Student should learn how to program using selection statements with combined conditions.
- 2- Student should learn how to combine conditions using logical operators (!, &&, and ||)
- 3- Student should learn how to write expressions using the conditional expression

## Lab Exercise 1

How cold is it outside? Temperature by itself is not enough. In 2001, the National Weather Service (NWS) in United States implemented the new **wind-chill temperature** to measure the coldness using temperature and wind speed. The formula is

$$t_{wc} = 35.74 + 0.6215t_a - 35.75v^{0.16} + 0.4275t_av^{0.16}$$

Where  $t_a$  is the outside temperature measured in degrees Fahrenheit and  $v$  is the speed measured in miles per hour.  $t_{wc}$  is the wind-chill temperature. The formula cannot be used for wind speeds below 2 mph or temperatures below  $-58^{\circ}\text{F}$  or above  $41^{\circ}\text{F}$ .

Write a program that prompts the user to enter a temperature and a wind speed. The program displays the wind-chill temperature if the input is valid; otherwise, it displays a message indicating whether the temperature and/or wind speed is invalid.

Here are sample runs:

```
Enter the temperature in Fahrenheit: 32 ↵
Enter the wind speed miles per hour: 30 ↵
The wind chill index is 17.59665069469402
```

```
Enter the temperature in Fahrenheit: 80 ↵
Temperature must be between -58F and 41F
```

```
Enter the temperature in Fahrenheit: 20 ↵
Enter the wind speed miles per hour: 1 ↵
Speed must be greater than or equal to 2
```

## Solution

- 1- Create a new project in eclipse and name it **lab04**
- 2- Create a new class and name it **WindChill**. Make sure you choose the public static void main option.
- 3- Write the program as following (you can ignore comments):

```
import java.util.Scanner;

public class WindChill {
    // Main method
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        // Enter the temperature in Fahrenheit
        System.out.print("Enter the temperature in Fahrenheit: ");
        double fahrenheit = input.nextDouble();

        If Temperature is less than -58F or more than 41F
            Print "Temperature must be between -58F and 41F"

        Else
            ... // Ask the user to enter the wind speed

            If speed is less than 2
                ... // Prompt the user that his input is wrong

            Else
                windChillIndex = 35.74 + 0.6215 * fahrenheit - 35.75
                    * Math.pow(speed, 0.16) + 0.4275 * fahrenheit
                    * Math.pow(speed, 0.16);
                Print windChillIndex
            End If
        End If
    }
}
```

- 4- When you are done, save your program and run it. Make sure it prints the output as shown above.

## Lab Exercise 2

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

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

$b^2 - 4ac$  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 that prompts the user to enter values for  $a$ ,  $b$ , and  $c$  and displays the result based on the discriminant. If the discriminant is positive, display two roots. If the discriminant is **0**, display one root. Otherwise, display **“The equation has no real roots”**.

Note that you can use `Math.pow(x, 0.5)` to compute  $\sqrt{x}$ .

Here are some sample runs:

```
Enter a, b, c: 1 3 1 ↵  
The equation has two roots -0.3819660112501051 and -2.618033988749895
```

```
Enter a, b, c: 1 2 1 ↵  
The equation has one root -1.0
```

```
Enter a, b, c: 1 2 3 ↵  
The equation has no real roots
```

## Solution

- 1- Use the same project **lab04** that you created before
- 2- Create a new class and name it **QuadEquation**. Make sure you choose the public static void main option.
- 3- Write the program as following (you can ignore comments):

```
import java.util.Scanner;

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

        System.out.print("Enter a, b, c: ");
        double a = input.nextDouble();
        double b = input.nextDouble();
        double c = input.nextDouble();

        double discriminant = b * b - 4 * a * c;

        If discriminant is less than 0
            Print "The equation has no real roots"

        ElseIf discriminant equals 0
            r1 = -b / (2 * a)
            ... // print the result

        Else
            Calculate r1 & r2
            ... // print the result

        EndIf
    }
}
```

- 4- When you are done, save your program and run it. Make sure it prints the output as shown above.

### Lab Exercise 3

Write a java program that will read a student's score in CSC111 out of 100 and then print the grade letter according to the following table. For example, if score is 93 then the student's grade is A.

Note: Make sure the score entered by the student is greater than or equal to zero and Less than or equal to a hundred.

Score	Grade
60 > Score	F
70 > Score >= 60	D
80 > Score >= 70	C
90 > Score >= 80	B
Score >= 90	A

Here are some sample runs:

```
Please enter the student's score out of 100 : 70
The student with score 70 has grade C
```

```
Please enter the student's score out of 100 : 92
The student with score 92 has grade A
```

```
Please enter the student's score out of 100 : 109
Sorry the score should be <= 100
```

## Solution

- 1 - Use the same project **lab04** that you created before
- 2 - Create a new class and name it **ScoreToGrade**. Make sure you choose the `public static void main` option.
- 3 - Write the program as following (you can ignore comments):

```
import java.util.Scanner;
public class ScoreToGrade {
    public static void main(String[] args) {
        Scanner kb = new Scanner(System.in);
        System.out.print("Please enter the student's score out of 100 :
");
        int score = kb.nextInt();
        if ( score >=0 && score <=100 ) {
            char grade = ' ';
            if ( score >= 90 ) grade = 'A';
            else if ( score >= 80 ) grade = 'B';
                else if ( score >= 70 ) grade = 'C';
                    else if ( score >= 60 ) grade = 'D';
                        else grade = 'F';
            System.out.println("The student with score "+score+" has grade
"+grade);
        }
        else if (score > 100) System.out.println("Sorry score must be <=
100");
        else System.out.println("Sorry score must >=0");
        kb.close();
    }
}
```