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

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

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

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^{o}F or above 41^{o}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
```

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
```

Lab Exercise 3

Write a program that reads an unspecified number of integers, determines how many positive and negative values have been read, and computes the total and average of the input values (not counting zeros). Your program ends with the input 0. Display the average as a floating-point number. Here are some sample runs:

```
Enter integers ending with 0: 1 2 -1 3 0
The number of positives is 3
The number of negatives is 1
The total is 5
The average is 1.25
```

```
Enter integers ending with 0: 0
no numbers are entered except 0
```

Lab Exercise 4

Write a program that prompts the user to enter the number of students and each student's name and score (at least two students), and finally displays the student with the highest score and the student with the second-highest score. Here is a sample runs:

```
Enter the number of students: 4
Enter a student name: Mohammed
Enter a student score: 75
Enter a student name: Ali
Enter a student score: 85
Enter a student name: Fahad
Enter a student score: 98
Enter a student name: Khalid
Enter a student score: 65
Top two students:
Fahad's score is 98.0
Ali's score is 85.0
```