



CSE 215L: Programming Language II Lab

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Lab 02 – Spring 2018

Objective:

After today's lab, the students should be able:

- To implement selection control using *one-way* and *two-way if* statements
- To implement selection control using *nested if* and *multi-way if* statements
- To write expressions using the conditional expression
- To combine conditions using logical operators (**!**, **&&**, **||**, and **^**)
- To implement selection control using **switch** statements

One-way if statement	Two-way if statement
<pre>if(boolean-expression) { statement(s); }</pre>	<pre>if (boolean-expression) { statement(s)-for-the-true-case; } else { statement(s)-for-the-false-case; }</pre>
Nested if statement	Multi-way if statement
<pre>if(Boolean-expression-1) { if(Boolean-expression-2) { statement(s); } }</pre>	<pre>if(Boolean-expression-1) { statement(s); } else if (Boolean-expression-2) { statement(s); } else if (Boolean-expression-n) { statement(s); } else{ statement(s); }</pre>
Switch statement	
<pre>switch (switch-expression) { case value1: statement(s)1; break; case value2: statement(s)2; break; ... case valueN: statement(s)N; break; default: statement(s)-for-default; }</pre>	

Task – 1

(Algebra: solve quadratic equations) 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”.

Task – 2

(Random month) Write a program that randomly generates an integer between 1 and 12 and displays the English month name January, February, ..., December for the number 1, 2, ..., 12, accordingly.

Task – 3

(Find future dates) Write a program that prompts the user to enter an integer for today’s day of the week (Sunday is 0, Monday is 1, ..., and Saturday is 6). Also prompt the user to enter the number of days after today for a future day and display the future day of the week. Here is a sample run:

```
Enter today's day: 1
Enter the number of days elapsed since today: 3
Today is Monday and the future day is Thursday
```

Task – 4

(Palindrome number) Write a program that prompts the user to enter a three-digit integer and determines whether it is a palindrome number. A number is palindrome if it reads the same from right to left and from left to right. Here is a sample run of this program:

```
Enter a three-digit integer: 121
121 is a palindrome
Enter a three-digit integer: 123
123 is not a palindrome
```

Task – 5

(Game: scissor, rock, paper) Write a program that plays the popular scissor-rock-paper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and displays a message indicating whether the user or the computer wins, loses, or draws. Here are sample runs:

```
scissor (0), rock (1), paper (2): 1
The computer is scissor. You are rock. You won
scissor (0), rock (1), paper (2): 2
The computer is paper. You are paper too. It is a draw
```

Task – 6

(Compute the perimeter of a triangle) Write a program that reads three edges for a triangle and computes the perimeter if the input is valid. Otherwise, display that the input is invalid. The input is valid if the sum of every pair of two edges is greater than the remaining edge.

Task – 7

(*Count positive and negative numbers and compute the average of numbers*) 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 is a sample run:

```
Enter an integer, the input ends if it is 0: 1 2 -1 3 0
The number of positives is 3
The number of negatives is 1
The total is 5.0
The average is 1.25
```

Task – 8

(*Conversion from kilograms to pounds and pounds to kilograms*) Write a program that displays the following two tables side by side:

Kilograms	Pounds		Pounds	Kilograms
1	2.2		20	9.09
3	6.6		25	11.36
...				
197	433.4		510	231.82
199	437.8		515	234.09

Task – 9

(*Find the two highest scores*) Write a program that prompts the user to enter the number of students and each student's name and score, and finally displays the student with the highest score and the student with the second-highest score.