CS1160
Lab 3: Control Statements

I. If statement

1. **If statement:** It is used to decide whether a certain statement/statements will be executed or not based on a certain condition.

```
if (condition)
{
   // statements to be executed if the condition is true
}
```

2. **If - else statement:** The else statement comes after the "if statement" to execute a block of code when the condition is false.

```
if (condition) {
   // statements to be executed if the condition is true
}
else {
   // statements to be executed if the condition is false
}
```

3. **If - else ladder:** allows you to check between multiple test expressions and execute different statements.

```
if (condition) {
   // statements to be executed if the condition is true
} else if (condition) {
   // statements to be executed if the condition is false
} else if (condition) {
   // statements to be executed if the condition is false
}
```

A "nested if" in C means an if statement inside another if statement

Sara Abu Sa'aleekk

Example:

❖ **Write a C program to do the following:**

a. Prompts the user to input three integers.

b. Reads the value for each integer.

c. Finds the **maximum value** among the three integers using `if…else if` statements.

Organize the output to appear as shown in the sample output below.

```c
int main() {
    int a, b, c, max;

    // Prompt the user to enter three integers
    printf("Enter the first integer: ");
    scanf("%d", &a);

    printf("Enter the second integer: ");
    scanf("%d", &b);

    printf("Enter the third integer: ");
    scanf("%d", &c);

    // Determine the maximum using if...else if statements
    if (a >= b && a >= c) {
        max = a;
    }
    else if (b >= a && b >= c) {
        max = b;
    }
    else {
        max = c;
    }

    // Display the result
    printf("The largest number is: %d\n", max);

    return 0;
```

```
Output

Enter the first integer: 5
Enter the second integer: 10
Enter the third integer: 9
The largest number is: 10
```

Sara Abu Sa'aleekk

الجامعة الألمانية الأردنية

II. Switch statement

The switch statement allow to execute one code block among many alternatives. The expression is evaluated once and compared with the values of each case label. The case value must be an integer or character constant.

If there is a match, the corresponding statements after the matching label are executed. If there is no match, the default statements are executed. The break statement is optional, but if it is not used, all statements after the matching label will be also executed.

```
switch (expression)
{
    case constant1:
     // statements
     break;

    case constant2:
     // statements
     break;
     .
    default:
     // default statements
}
```

III. Goto statement

The goto statement allows us to transfer control of the program to the specified label.

```
goto label;
…
label:
statements;
```

Sara Abu Sa'aleekk

IV. Example

❖ **Write a C program to create a Simple Calculator as follows:**

a. Prompt the user to input an operation (+, -, *, or /).

b. Read the values for two numbers.

c. Find the result of the entered operation on the two values using a **switch statement**.

```c
int main() {
    char op;
    float num1, num2, result;

    // Prompt the user to input an operation
    printf("Enter an operation (+, -, *, /): ");
    scanf(" %c", &op); // space before %c to ignore newline

    // Prompt the user to input two numbers
    printf("Enter the first number: ");
    scanf("%f", &num1);

    printf("Enter the second number: ");
    scanf("%f", &num2);
```

Sara Abu Sa'aleekk

الجامعة الألمانية الأردنية

```c
    // Perform calculation based on operation using switch
    switch (op) {
        case '+':
            result = num1 + num2;
            printf("Result: %.2f + %.2f = %.2f\n", num1, num2, result);
            break;

        case '-':
            result = num1 - num2;
            printf("Result: %.2f - %.2f = %.2f\n", num1, num2, result);
            break;
    case '*':
        result = num1 * num2;
        printf("Result: %.2f * %.2f = %.2f\n", num1, num2, result);
        break;

    case '/':
        if (num2 != 0)
            printf("Result: %.2f / %.2f = %.2f\n", num1, num2, num1 / num2);
        else
            printf("Error: Division by zero is not allowed.\n");
        break;

    default:
        printf("Invalid operation!\n");
}

return 0;
```

Output

```
Enter an operation (+, -, *, /): +
Enter the first number: 6
Enter the second number: 3
Result: 6.00 + 3.00 = 9.00
```

Output

```
Enter an operation (+, -, *, /): -
Enter the first number: 6
Enter the second number: 3
Result: 6.00 - 3.00 = 3.00
```

Output

```
Enter an operation (+, -, *, /): *
Enter the first number: 6
Enter the second number: 3
Result: 6.00 * 3.00 = 18.00
```

Output

```
Enter an operation (+, -, *, /): /
Enter the first number: 6
Enter the second number: 3
Result: 6.00 / 3.00 = 2.00
```

Sara Abu Sa'aleekk

IV. Tasks

Write a complete C program (using if...else) :

1. Prompts the user to enter the temperature in Celsius (integer).
2. Reads the entered temperature.
3. Determines and displays the temperature classification according to the following table:

Temperature (°C)	Classification
35 and above	Extremely Hot
30 – 34	Hot
25 – 29	Warm
20 – 24	Mild
15 – 19	Cool
10 – 14	Chilly
Below 10	Cold

Sample Output

```
Enter the temperature in Celsius: 28
Temperature Classification: Warm
```

```
Enter the temperature in Celsius: 7
Temperature Classification: Cold
```

Sara Abu Sa'aleekk

❖ Write a C program (using switch) that computes the area of different shapes as follows:

a. The program asks the user to specify the shape:

    - C for Circle

    - R for Rectangle

    - T for Triangle

    - S for Square

b. Reads the required values to compute the **area** for the specified shape.

c. **Formula to use:**

    - **Circle:** Area = $\pi \times radius^2$

    - **Square:** Area = side × side

    - **Rectangle:** Area = width × length

    - **Triangle:** Area = 0.5 × base × height

d. c. Displays the result clearly.

Sample Output

```
Select a shape to calculate area (C - Circle, R - Rectangle, T - Triangle, S - Square): C
Enter the radius of the circle: 5
Area of the circle = 78.54
```

```
Select a shape to calculate area (C - Circle, R - Rectangle, T - Triangle, S - Square): R
Enter the length of the rectangle: 8
Enter the width of the rectangle: 3
Area of the rectangle = 24.00
```

Sara Abu Sa'aleekk