If-Then-Else

1. If statement

The if keyword is used to execute a statement or block only if a condition is fulfilled. Its form is:

    if (condition) statement

where condition is the expression that is being evaluated. If this condition is true, statement is executed. If it is false, statement is ignored (not executed) and the program continues right after this conditional structure. The statement can be replaced by a block of statements using { }.

We can additionally specify what we want to happen if the condition is not fulfilled by using the keyword else. Its form used in conjunction with if is:

    if (condition) statement1 else statement2

```cpp
int i;

cout << "Enter a number between 1 and 100?";
cin >> i;

if(i < 50){
    cout << "Your number is less than 50\n";
} else{
    cout << "Your number is greater than or equal to 50\n";
}
```

The conditions are:

- `==` (double equal signs) equal
- `>` greater than
- `<` less than
- `>=` greater than or equal
- `<=` less than or equal
- `!=` not equal
- `||` (double vertical bars) logical or
- `&&` logical and
2. Exercises (Problems with an asterisk are more difficult)

Note that some problems can be solved without the use of the IF statement. In fact, the use of the IF statement in these solutions is redundant. If this is the case then DO NOT use the IF statement.

1. Write a program to enter two numbers, \( num1 \) and \( num2 \). \( num1 \) is divided by \( num2 \) and the result is displayed. Before the division, \( num2 \) is tested for the value 0. If it is a 0, the division does not take place with an appropriate message.

2. Write a program to enter two numbers and then print out the two numbers in ascending order.

3. Write a program to enter three numbers representing the length of the three sides of a triangle. Print out whether the three lengths can form a valid triangle or not.

4. Just like question 1, but if \( num2 \) is a 0 then request the user to enter another number. Keep repeating this until a none-0 number is entered.

5. ** Write a program to enter three numbers and then print out the three numbers in ascending order. Hint: put the first two numbers on a number line and then determine the different options where the third number can be placed on the line. Only need to use two IF statements to determine the placement of the third number.

6. Write a program to enter a temperature. If the temperature is less than 20 or greater than 100, then print the message “The temperature is in the danger zone.”

7. Just like 6 but in addition if the temperature is not in the danger zone then print the message “The temperature is fine.”

8. To qualify for a certain government grant, a person must have worked more than 5 years and earn at least $35,000. Write a program to enter the number of years a person has worked and his/her annual income, then print out whether the person qualifies for the grant or not. You need to print out one of the following messages:
   
   “You qualify for the government grant”
   “You do not qualify because you need to work for more than 5 years”
   “You do not qualify because you need to earn more than $35,000”

9. Write a program to generate two random numbers between 0 and 100. Ask the user to enter the answer for the first number plus the second number. Print out whether the number entered by the user is correct or not. See the Random Number document on how to generate random numbers.

10. * Same as question 9 but keep asking for the answer if the answer is not correct.
11. * Write a program to enter a numeric grade which is an integer between 0 and 100. The program will then print out the letter grade as follows:

- 90 to 100 A
- 80 to 89 B
- 70 to 79 C
- 60 to 69 D
- 50 to 59 F

Hint: need to use multiple IF statements.

12. * Write a program to enter how many books are being purchased. Depending on the number of books purchased, a customer gets a certain percentage discount as follows:

- 5 or more books 20%
- 3 to 4 books 10%
- Less than 3 books 5%

Print out the percentage discount that the customer gets.

13. * Write a program that displays the following menu:

1. Calculate the area of a circle
2. Calculate the area of a rectangle
3. Calculate the area of a triangle
4. Quit

Enter your choice (1-4)?

Your program will ask for additional information and perform the appropriate calculation depending on the user choice.

- The area of a circle is \( \pi r^2 \) (use 3.14159 for \( \pi \))
- The area of a rectangle is length * width
- The area of a triangle is base * height / 2

Additional user input:
- radius
- length and width
- base and height