SOLUTION BOOK

❤️ From SIDDHARTH SINGH

IF-ELSE

1) **Check Whether Number is Even or Odd**

Method 1: Using if else

```
#include <iostream>
using namespace std;

int main() {
  int n;

  cout << "Enter an integer: ";
  cin >> n;

  if ( n % 2 == 0)
    cout << n << " is even.";
  else
    cout << n << " is odd.";

  return 0;
}
```

Output

```
Enter an integer: 23
23 is odd.
```

Method 2: Using ternary operators

```
#include <iostream>
using namespace std;

int main() {
  int n;

  cout << "Enter an integer: ";
  cin >> n;

  (n % 2 == 0) ? cout << n << " is even." :  cout << n << " is odd.";
```

```
  return 0;
}
```

CONCEPT:

We used **ternary operators ?:** instead of if..else statement. The ternary operator is a shorthand notation of if...else statement.

2) **Check Whether a character is Vowel or Consonant**.

CODE:

```
#include <iostream>
using namespace std;

int main() {
    char c;
    bool isLowercaseVowel, isUppercaseVowel;

    cout << "Enter an alphabet: ";
    cin >> c;

    // evaluates to 1 (true) if c is a lowercase vowel
    isLowercaseVowel = (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u');

    // evaluates to 1 (true) if c is an uppercase vowel
    isUppercaseVowel = (c == 'A' || c == 'E' || c == 'I' || c == 'O' || c == 'U');

    // show error message if c is not an alphabet
    if (!isalpha(c))
      printf("Error! Non-alphabetic character.");
    else if (isLowercaseVowel || isUppercaseVowel)
        cout << c << " is a vowel.";
    else
        cout << c << " is a consonant.";

    return 0;
}
```

Output

```
Enter an alphabet: u
u is a vowel.
```

CONCEPT:

The **isalpha()** function checks whether the character entered is an alphabet or not. If it is not, it prints an error message.

3) Program to Find Largest Number Among Three Numbers

Method 1: Using if...else Statement

```
#include <iostream>
using namespace std;

int main() {
   float n1, n2, n3;

   cout << "Enter three numbers: ";
   cin >> n1 >> n2 >> n3;

   if((n1 >= n2) && (n1 >= n3))
      cout << "Largest number: " << n1;
   else if ((n2 >= n1) && (n2 >= n3))
      cout << "Largest number: " << n2;
   else
      cout << "Largest number: " << n3;

   return 0;
}
```

Output

```
Enter three numbers: 2.3
8.3
-4.2
Largest number: 8.3
```

Method 2: Using Nested if...else statement

```
#include <iostream>
using namespace std;

int main() {
   float n1, n2, n3;

   cout << "Enter three numbers: ";
   cin >> n1 >> n2 >> n3;
```

```
    if (n1 >= n2) {
        if (n1 >= n3)
            cout << "Largest number: " << n1;
        else
            cout << "Largest number: " << n3;
    }
    else {
        if (n2 >= n3)
            cout << "Largest number: " << n2;
        else
            cout << "Largest number: " << n3;
    }

    return 0;
}
```

Output

```
Enter three numbers: 2.3
8.3
-4.2
Largest number: 8.3
```

4) Program to Find All Roots of a Quadratic Equation

CODE:

```
#include <iostream>
#include <cmath>
using namespace std;

int main() {

    float a, b, c, x1, x2, discriminant, realPart, imaginaryPart;
    cout << "Enter coefficients a, b and c: ";
    cin >> a >> b >> c;
    discriminant = b*b - 4*a*c;

    if (discriminant > 0) {
        x1 = (-b + sqrt(discriminant)) / (2*a);
        x2 = (-b - sqrt(discriminant)) / (2*a);
        cout << "Roots are real and different." << endl;
        cout << "x1 = " << x1 << endl;
```

```
        cout << "x2 = " << x2 << endl;
    }

    else if (discriminant == 0) {
        cout << "Roots are real and same." << endl;
        x1 = -b/(2*a);
        cout << "x1 = x2 =" << x1 << endl;
    }

    else {
        realPart = -b/(2*a);
        imaginaryPart =sqrt(-discriminant)/(2*a);
        cout << "Roots are complex and different."  << endl;
        cout << "x1 = " << realPart << "+" << imaginaryPart << "i" << endl;
        cout << "x2 = " << realPart << "-" << imaginaryPart << "i" << endl;
    }

    return 0;
}
```

Output

```
Enter coefficients a, b and c: 4
5
1
Roots are real and different.
x1 = -0.25
x2 = -1
```

CONCEPT:

In this program, sqrt() library function is used to find the square root of a number.

5) Program to Calculate Sum of first N Natural Numbers

We have to display the value of 1+2+3+....+N.

CODE:

```
#include <iostream>
using namespace std;

int main() {
    int n, sum = 0;

    cout << "Enter a positive integer: ";
```

```
    cin >> n;

    for (int i = 1; i <= n; ++i) {
        sum += i;
    }

    cout << "Sum = " << sum;
    return 0;
}
```

Output

```
Enter a positive integer: 50
Sum = 1275
```

NOTE: If a user enters a negative number, Sum = 0 is displayed and program is terminated.

6) Program to Check Leap Year

CODE:

```
#include <iostream>
using namespace std;

int main() {
    int year;

    cout << "Enter a year: ";
    cin >> year;

    if (year % 4 == 0) {
        if (year % 100 == 0) {
            if (year % 400 == 0)
                cout << year << " is a leap year.";
            else
                cout << year << " is not a leap year.";
        }
        else
            cout << year << " is a leap year.";
    }
    else
        cout << year << " is not a leap year.";
```

```
    return 0;
}
```

Output

```
Enter a year: 2014
2014 is not a leap year
```