Solution for Question 1: Basic Addition

```cpp
#include <iostream>
using namespace std;
int main() {
    int num1, num2, sum;
    // Input two numbers
    cout << "Enter two numbers: ";
    cin >> num1 >> num2;
    // Calculate sum
    sum = num1 + num2;
    // Display result
    cout << "The sum is: " << sum << endl;
    return 0;
}
```

Solution for Question 2: Area of a Rectangle

```cpp
#include <iostream>
using namespace std;
int main() {
    double length, width, area;
    // Input length and width
    cout << "Enter the length of the rectangle: ";
    cin >> length;
    cout << "Enter the width of the rectangle: ";
    cin >> width;
    // Calculate area
    area = length * width;
    // Display result
    cout << "The area of the rectangle is: " << area << endl;
    return 0;
}
```

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Solution for Question 3: Product of Three Numbers

```cpp
#include <iostream>
using namespace std;
int main() {
    int num1, num2, num3, product;
    // Input three numbers
    cout << "Enter three numbers: ";
    cin >> num1 >> num2 >> num3;
    // Calculate product
    product = num1 * num2 * num3;
    // Display result
    cout << "The product is: " << product << endl;
    return 0;
}
```

Solution for Question 4: Simple Interest Calculation

```cpp
#include <iostream>
using namespace std;
int main() {
    double principal, rate, time, simpleInterest;
    // Input principal, rate, and time
    cout << "Enter principal amount: ";
    cin >> principal;
    cout << "Enter rate of interest: ";
    cin >> rate;
    cout << "Enter time in years: ";
    cin >> time;
    // Calculate simple interest
    simpleInterest = (principal * rate * time) / 100;
    // Display result
    cout << "The Simple Interest is: " << simpleInterest << endl;
    return 0;
}
```

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Question 5: Circle Properties

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

int main() {
    double radius, area, circumference;
    const double PI = 3.14;

    // Input radius
    cout << "Enter the radius of the circle: ";
    cin >> radius;

    // Calculate area and circumference
    area = PI * radius * radius;
    circumference = 2 * PI * radius;

    // Display results
    cout << "Area: " << area << endl;
    cout << "Circumference: " << circumference << endl;

    return 0;
}
```

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Solution for Question 6: Even or Odd

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

int main() {
    int num;

    // Input number
    cout << "Enter a number: ";
    cin >> num;

    // Check even or odd
    if (num % 2 == 0) {
        cout << num << " is even." << endl;
    } else {
        cout << num << " is odd." << endl;
    }

    return 0;
}
```

Solution for Question 7: Temperature Conversion

```cpp
#include <iostream>
using namespace std;
int main() {
    double celsius, fahrenheit;
    // Input temperature in Celsius
    cout << "Enter temperature in Celsius: ";
    cin >> celsius;
    // Convert to Fahrenheit
    fahrenheit = (celsius * 9 / 5) + 32;
    // Display result
    cout << "Temperature in Fahrenheit: " << fahrenheit << endl;
    return 0;
}
```

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Solution for Question 8: Quotient and Remainder

```cpp
#include <iostream>
using namespace std;
int main() {
    int dividend, divisor, quotient, remainder;
    // Input dividend and divisor
    cout << "Enter dividend: ";
    cin >> dividend;
    cout << "Enter divisor: ";
    cin >> divisor;
    // Calculate quotient and remainder
    quotient = dividend / divisor;
    remainder = dividend % divisor;
    // Display results
    cout << "Quotient: " << quotient << endl;
    cout << "Remainder: " << remainder << endl;
    return 0;
}
```

Solution for Question 9: Average of Five Numbers

```cpp
#include <iostream>
using namespace std;
int main() {
    double num1, num2, num3, num4, num5, average;
    // Input five numbers
    cout << "Enter five numbers: ";
    cin >> num1 >> num2 >> num3 >> num4 >> num5;
    // Calculate average
    average = (num1 + num2 + num3 + num4 + num5) / 5;
    // Display result
    cout << "The average is: " << average << endl;
    return 0;
}
```

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Solution for Question 10: Square and Cube of a Number

```cpp
#include <iostream>
using namespace std;
int main() {
    int num, square, cube;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Calculate square and cube
    square = num * num;
    cube = num * num * num;
    // Display results
    cout << "Square: " << square << endl;
    cout << "Cube: " << cube << endl;
    return 0;
}
```

Solution for Question 11: Check Voting Eligibility

```cpp
#include <iostream>
using namespace std;
int main() {
    int age;
    bool isCitizen;
    // Input age and citizenship status
    cout << "Enter age: ";
    cin >> age;
    cout << "Are you a citizen? Enter 1 for Yes or 0 for No: ";
    cin >> isCitizen;
    // Check voting eligibility
    if (age >= 18 && isCitizen) {
        cout << "You are eligible to vote." << endl;
    } else {
        cout << "You are not eligible to vote." << endl;
    }
    return 0;
}
```

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Solution for Question 12: Check Leap Year

```cpp
#include <iostream>
using namespace std;
int main() {
    int year;
    // Input year
    cout << "Enter a year: ";
    cin >> year;
    // Check leap year conditions
    if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)) {
        cout << year << " is a leap year." << endl;
    } else {
        cout << year << " is not a leap year." << endl;
    }
    return 0;
}
```

Solution for Question 13: Logical AND and OR Demonstration

```cpp
#include <iostream>
using namespace std;
int main() {
    bool a, b;
    // Input boolean values
    cout << "Enter two boolean values (1 for true, 0 for false): ";
    cin >> a >> b;
    // Perform logical operations
    cout << "a AND b: " << (a && b) << endl;
    cout << "a OR b: " << (a || b) << endl;
    return 0;
}
```

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Solution for Question 14: Number Range Check

```
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Check if number lies in range [10, 50]
    if (num >= 10 && num <= 50) {
        cout << num << " lies within the range [10, 50]." << endl;
    } else {
        cout << num << " does not lie within the range [10, 50]." <<
endl;
    }
    return 0;
}
```

Solution for Question15: Check Password Validity

```
#include <iostream>
#include <string>
using namespace std;
int main() {
    string password;
    // Input password
    cout << "Enter a password: ";
    getline(cin, password);
    // Check password validity
    if (password.length() >= 8 && password.find(' ') == string::npos)
{
        cout << "Password is valid." << endl;
    } else {
        cout << "Password is invalid." << endl;
    }
    return 0;
}
```

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Assignment Operator:

Solutions

Solution for Question 16: Basic Assignment and Display

```
#include <iostream>
using namespace std;
int main() {
    int num;
    // Assign a value using the assignment operator
    num = 25;
    // Display the value
    cout << "The value of num is: " << num << endl;
    return 0;
}
```

Solution for Question 17: Increment and Assign

```
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Add 10 using the += operator
    num += 10;
    // Display the updated value
    cout << "The updated value is: " << num << endl;
    return 0;
}
```

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Solution for Question 18: Subtract and Assign

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Subtract 5 using the -= operator
    num -= 5;
    // Display the updated value
    cout << "The updated value is: " << num << endl;
    return 0;
}
```

Solution for Question 19: Multiply and Assign

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Multiply by 2 using the *= operator
    num *= 2;
    // Display the updated value
    cout << "The updated value is: " << num << endl;
    return 0;
}
```

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Solution for Question 20: Divide and Assign

```
#include <iostream>
using namespace std;
int main() {
    double num1, num2;
    // Input two numbers
    cout << "Enter the first number: ";
    cin >> num1;
    cout << "Enter the second number: ";
    cin >> num2;
    // Check if the divisor is not zero
    if (num2 != 0) {
        // Divide num1 by num2 using the /= operator
        num1 /= num2;
        // Display the updated value
        cout << "The updated value of the first number is: " << num1
<< endl;
    } else {
        cout << "Division by zero is not allowed!" << endl;
    }
    return 0;
}
```

Solution for Question 21: Pre-increment Example

```
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Use pre-increment
    ++num;
    // Display the result
    cout << "The value after pre-increment is: " << num << endl;
    return 0;
}
```

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Solution for Question 22: Post-increment Example

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Use post-increment
    cout << "The value before post-increment is: " << num << endl;
    num++;
    cout << "The value after post-increment is: " << num << endl;
    return 0;
}
```

Solution for Question 23: Pre-decrement Example

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Use pre-decrement
    --num;
    // Display the result
    cout << "The value after pre-decrement is: " << num << endl;
    return 0;
}
```

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Solution for Question 24: Post-decrement Example

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Use post-decrement
    cout << "The value before post-decrement is: " << num << endl;
    num--;
    cout << "The value after post-decrement is: " << num << endl;
    return 0;
}
```

Solution for Question 25: Increment and Decrement Combined

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input a number
    cout << "Enter a number: ";
    cin >> num;
    // Perform increment and decrement
    cout << "Original value: " << num << endl;
    ++num;
    cout << "Value after pre-increment: " << num << endl;
    num--;
    cout << "Value after post-decrement: " << num << endl;
    return 0;
}
```

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if-else statements :

Solution for Question 26: Check Positive or Negative Number

```
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Check if positive, negative, or zero
    if (num > 0)
        cout << "The number is positive." << endl;
    else if (num < 0)
        cout << "The number is negative." << endl;
    else
        cout << "The number is zero." << endl;
    return 0;
}
```

Solution for Question 27: Odd or Even Check

```
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Check odd or even
    if (num % 2 == 0)
        cout << "The number is even." << endl;
    else
        cout << "The number is odd." << endl;
    return 0;
}
```

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Solution for Question 28: Check Maximum of Two Numbers

```cpp
#include <iostream>
using namespace std;
int main() {
    int num1, num2;
    // Input two numbers
    cout << "Enter two numbers: ";
    cin >> num1 >> num2;
    // Find maximum
    if (num1 > num2)
        cout << "The maximum is: " << num1 << endl;
    else
        cout << "The maximum is: " << num2 << endl;
    return 0;
}
```

Solution for Question 29: Grade Evaluation

```cpp
#include <iostream>
using namespace std;
int main() {
    int marks;
    // Input marks
    cout << "Enter your marks: ";
    cin >> marks;
    // Determine grade
    if (marks >= 90)
        cout << "Grade: A" << endl;
    else if (marks >= 80)
        cout << "Grade: B" << endl;
    else if (marks >= 70)
        cout << "Grade: C" << endl;
    else
        cout << "Grade: Fail" << endl;
    return 0;
}
```

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Solution for Question 30: Leap Year Check

```cpp
#include <iostream>
using namespace std;
int main() {
    int year;
    // Input year
    cout << "Enter a year: ";
    cin >> year;
    // Check leap year
    if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0))
        cout << year << " is a leap year." << endl;
    else
        cout << year << " is not a leap year." << endl;
    return 0;
}
```

Solution for Question 31: Divisibility Check

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Check divisibility
    if (num % 3 == 0 && num % 5 == 0)
        cout << num << " is divisible by both 3 and 5." << endl;
    else
        cout << num << " is not divisible by both 3 and 5." << endl;
    return 0;
}
```

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Solution for Question 32: Check Voting Eligibility

```cpp
#include <iostream>
using namespace std;
int main() {
    int age;
    // Input age
    cout << "Enter your age: ";
    cin >> age;
    // Check voting eligibility
    if (age >= 18)
        cout << "You are eligible to vote." << endl;
    else
        cout << "You are not eligible to vote." << endl;
    return 0;
}
```

Solution for Question 33: Check Alphabet Case

```cpp
#include <iostream>
using namespace std;
int main() {
    char ch;
    // Input character
    cout << "Enter a character: ";
    cin >> ch;
    // Check case
    if (ch >= 'A' && ch <= 'Z')
        cout << ch << " is an uppercase letter." << endl;
    else if (ch >= 'a' && ch <= 'z')
        cout << ch << " is a lowercase letter." << endl;
    else
        cout << ch << " is not a letter." << endl;
    return 0;
}
```

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Solution for Question 34: Largest of Three Numbers

```cpp
#include <iostream>
using namespace std;
int main() {
    int num1, num2, num3;
    // Input three numbers
    cout << "Enter three numbers: ";
    cin >> num1 >> num2 >> num3;
    // Find the largest number
    if (num1 >= num2 && num1 >= num3)
        cout << "The largest number is: " << num1 << endl;
    else if (num2 >= num1 && num2 >= num3)
        cout << "The largest number is: " << num2 << endl;
    else
        cout << "The largest number is: " << num3 << endl;
    return 0;
}
```

Solution for Question 35: Check Pass/Fail

```cpp
#include <iostream>
using namespace std;
int main() {
    int marks;
    // Input marks
    cout << "Enter your marks: ";
    cin >> marks;
    // Check pass or fail
    if (marks >= 40)
        cout << "You have passed the exam." << endl;
    else
        cout << "You have failed the exam." << endl;
    return 0;
}
```

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Switch Statements:

Solutions

Solution for Question 36: Day of the Week

```cpp
#include <iostream>
using namespace std;
int main() {
    int day;
    // Input day number
    cout << "Enter a number (1-7): ";
    cin >> day;
    // Determine the day of the week
    switch (day) {
        case 1: cout << "Monday" << endl; break;
        case 2: cout << "Tuesday" << endl; break;
        case 3: cout << "Wednesday" << endl; break;
        case 4: cout << "Thursday" << endl; break;
        case 5: cout << "Friday" << endl; break;
        case 6: cout << "Saturday" << endl; break;
        case 7: cout << "Sunday" << endl; break;
        default: cout << "Invalid input!" << endl;
    }
    return 0;
}
```

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Solution for Question 37: Calculator

```
#include <iostream>
using namespace std;
int main() {
    int choice;
    double num1, num2, result;
    // Input two numbers and the operation choice
    cout << "Enter two numbers: ";
    cin >> num1 >> num2;
    cout << "Choose an operation:\n1. Addition\n2. Subtraction\n3.
Multiplication\n4. Division\n";
    cin >> choice;
    // Perform operation based on choice
    switch (choice) {
        case 1:
            result = num1 + num2;
            cout << "Result: " << result << endl;
            break;
        case 2:
            result = num1 - num2;
            cout << "Result: " << result << endl;
            break;
        case 3:
            result = num1 * num2;
            cout << "Result: " << result << endl;
            break;
        case 4:
            if (num2 != 0) {
                result = num1 / num2;
                cout << "Result: " << result << endl;
            } else {
                cout << "Division by zero is not allowed!" << endl;
            }
            break;
        default:
            cout << "Invalid choice!" << endl;
    }
    return 0;
}
```

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Solution for Question 38: Vowel or Consonant Check

```cpp
#include <iostream>
using namespace std;
int main() {
    char ch;
    // Input character
    cout << "Enter a letter: ";
    cin >> ch;
    // Check if vowel or consonant
    switch (ch) {
        case 'a': case 'e': case 'i': case 'o': case 'u':
        case 'A': case 'E': case 'I': case 'O': case 'U':
            cout << ch << " is a vowel." << endl;
            break;
        default:
            cout << ch << " is a consonant." << endl;
    }
    return 0;
}
```

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Solution for Question 39: Month Name Display

```cpp
#include <iostream>
using namespace std;
int main() {
    int month;
    // Input month number
    cout << "Enter a number (1-12): ";
    cin >> month;
    // Display the month name
    switch (month) {
        case 1: cout << "January" << endl; break;
        case 2: cout << "February" << endl; break;
        case 3: cout << "March" << endl; break;
        case 4: cout << "April" << endl; break;
        case 5: cout << "May" << endl; break;
        case 6: cout << "June" << endl; break;
        case 7: cout << "July" << endl; break;
        case 8: cout << "August" << endl; break;
        case 9: cout << "September" << endl; break;
        case 10: cout << "October" << endl; break;
        case 11: cout << "November" << endl; break;
        case 12: cout << "December" << endl; break;
        default: cout << "Invalid input!" << endl;
    }
    return 0;
}
```

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Solution for Question 40: Simple Grading System

```cpp
#include <iostream>
using namespace std;
int main() {
    char grade;
    // Input grade
    cout << "Enter your grade (A, B, C, D, F): ";
    cin >> grade;
    // Display message based on grade
    switch (grade) {
        case 'A': case 'a':
            cout << "Excellent!" << endl;
            break;
        case 'B': case 'b':
            cout << "Good!" << endl;
            break;
        case 'C': case 'c':
            cout << "Average." << endl;
            break;
        case 'D': case 'd':
            cout << "Below Average." << endl;
            break;
        case 'F': case 'f':
            cout << "Fail." << endl;
            break;
        default:
            cout << "Invalid grade!" << endl;
    }
    return 0;
}
```

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For Loop Concept:

Questions

Solutions

Solution for Question 41: Print Numbers from 1 to N

```cpp
#include <iostream>
using namespace std;
int main() {
    int N;
    // Input N
    cout << "Enter a positive integer: ";
    cin >> N;
    // Print numbers from 1 to N
    cout << "Numbers from 1 to " << N << " are: ";
    for (int i = 1; i <= N; i++) {
        cout << i << " ";
    }
    cout << endl;
    return 0;
}
```

Solution for Question 42: Print Multiplication Table

```cpp
#include <iostream>
using namespace std;
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Print multiplication table
    cout << "Multiplication table of " << num << ":" << endl;
    for (int i = 1; i <= 10; i++) {
        cout << num << " x " << i << " = " << num * i << endl;
    }
    return 0;
}
```

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Solution for Question 43: Sum of First N Natural Numbers

```
#include <iostream>
using namespace std;
int main() {
    int N, sum = 0;
    // Input N
    cout << "Enter a positive integer: ";
    cin >> N;
    // Calculate sum
    for (int i = 1; i <= N; i++) {
        sum += i;
    }
    cout << "Sum of first " << N << " natural numbers is: " << sum <<
endl;
    return 0;
}
```

Solution for Question 44: Print Even Numbers from 1 to N

```
#include <iostream>
using namespace std;
int main() {
    int N;
    // Input N
    cout << "Enter a positive integer: ";
    cin >> N;
    // Print even numbers
    cout << "Even numbers from 1 to " << N << " are: ";
    for (int i = 2; i <= N; i += 2) {
        cout << i << " ";
    }
    cout << endl;
    return 0;
}
```

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Solution for Question 45: Factorial of a Number

```cpp
#include <iostream>
using namespace std;
int main() {
    int N;
    unsigned long long factorial = 1;
    // Input N
    cout << "Enter a positive integer: ";
    cin >> N;
    // Calculate factorial
    for (int i = 1; i <= N; i++) {
        factorial *= i;
    }
    cout << "Factorial of " << N << " is: " << factorial << endl;
    return 0;
}
```

Variable Concept:

Solutions
Solution for Question 46: Simple Variable Declaration and Output

```cpp
#include <iostream>
using namespace std;
int main() {
    // Declare variables
    string name = "John Doe";
    int age = 25;
    string country = "India";
    // Output variables
    cout << "Name: " << name << endl;
    cout << "Age: " << age << endl;
    cout << "Country: " << country << endl;
    return 0;
}
```

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Solution for Question 47: Area of a Rectangle

```cpp
#include <iostream>
using namespace std;
int main() {
    float length, width, area;
    // Input length and width
    cout << "Enter the length of the rectangle: ";
    cin >> length;
    cout << "Enter the width of the rectangle: ";
    cin >> width;
    // Calculate area
    area = length * width;
    // Display area
    cout << "The area of the rectangle is: " << area << endl;
    return 0;
}
```

Solution for Question 48: Swap Two Numbers

```cpp
#include <iostream>
using namespace std;
int main() {
    int a, b, temp;
    // Input two numbers
    cout << "Enter the first number (a): ";
    cin >> a;
    cout << "Enter the second number (b): ";
    cin >> b;
    // Swap using a temporary variable
    temp = a;
    a = b;
    b = temp;
    // Display swapped values
    cout << "After swapping:" << endl;
    cout << "a = " << a << endl;
    cout << "b = " << b << endl;
    return 0;
}
```

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Solution for Question 49: Simple Interest Calculation

```
#include <iostream>
using namespace std;
int main() {
    float principal, rate, time, simpleInterest;
    // Input principal, rate, and time
    cout << "Enter the principal amount: ";
    cin >> principal;
    cout << "Enter the rate of interest: ";
    cin >> rate;
    cout << "Enter the time (in years): ";
    cin >> time;
    // Calculate simple interest
    simpleInterest = (principal * rate * time) / 100;
    // Display result
    cout << "The simple interest is: " << simpleInterest << endl;
    return 0;
}
```

Solution for Question 50: Average of Three Numbers

```
#include <iostream>
using namespace std;
int main() {
    float num1, num2, num3, average;
    // Input three numbers
    cout << "Enter the first number: ";
    cin >> num1;
    cout << "Enter the second number: ";
    cin >> num2;
    cout << "Enter the third number: ";
    cin >> num3;
    // Calculate average
    average = (num1 + num2 + num3) / 3;
    // Display result
    cout << "The average of the three numbers is: " << average <<
endl;
    return 0;
}
```

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String Concept:

Solution for Question 51: Concatenate Two Strings

```cpp
#include <iostream>
#include <string>
using namespace std;
int main() {
    string str1, str2;
    // Input two strings
    cout << "Enter the first string: ";
    cin >> str1;
    cout << "Enter the second string: ";
    cin >> str2;
    // Concatenate strings
    string result = str1 + str2;
    // Display the concatenated string
    cout << "Concatenated string: " << result << endl;
    return 0;
}
```

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Solution for Question 52: Extract a Substring

```
#include <iostream>
#include <string>
using namespace std;
int main() {
    string str;
    int start, length;
    // Input string
    cout << "Enter a string: ";
    cin >> str;
    // Input starting position and length for substring
    cout << "Enter the starting position: ";
    cin >> start;
    cout << "Enter the length of the substring: ";
    cin >> length;
    // Extract substring
    string substring = str.substr(start, length);
    // Display the substring
    cout << "The substring is: " << substring << endl;
    return 0;
}
```

Solution for Question 53: Find the Length of a String

```
#include <iostream>
#include <string>
using namespace std;
int main() {
    string str;
    // Input string
    cout << "Enter a string: ";
    cin >> str;
    // Find and display the length of the string
    cout << "The length of the string is: " << str.length() << endl;
    return 0;
}
```

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Solution for Question 54: Convert a String to Uppercase

```cpp
#include <iostream>
#include <string>
#include <cctype>
using namespace std;
int main() {
    string str;
    // Input string
    cout << "Enter a string: ";
    cin >> str;
    // Convert to uppercase
    for (int i = 0; i < str.length(); i++) {
        str[i] = toupper(str[i]);
    }
    // Display the string in uppercase
    cout << "String in uppercase: " << str << endl;
    return 0;
}
```

Solution for Question 55: Convert a String to Lowercase

```cpp
#include <iostream>
#include <string>
#include <cctype>
using namespace std;
int main() {
    string str;
    // Input string
    cout << "Enter a string: ";
    cin >> str;
    // Convert to lowercase
    for (int i = 0; i < str.length(); i++) {
        str[i] = tolower(str[i]);
    }
    // Display the string in lowercase
    cout << "String in lowercase: " << str << endl;
    return 0;
}
```

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Solution for Question 56: Check if String is Empty

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

int main() {
    string str;

    // Input string
    cout << "Enter a string: ";
    cin >> str;

    // Check if the string is empty
    if (str.empty()) {
        cout << "The string is empty." << endl;
    } else {
        cout << "The string is not empty." << endl;
    }

    return 0;
}
```

Built in Functions:
Solution for Question 57: Find the Square Root of a Number

```
#include <iostream>
#include <cmath>  // For sqrt() function
using namespace std;
int main() {
    double num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Calculate and display square root
    cout << "The square root of " << num << " is: " << sqrt(num) <<
endl;
    return 0;
}
```

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Solution for Question 58: Find the Power of a Number

```
#include <iostream>
#include <cmath>  // For pow() function
using namespace std;
int main() {
    double base, exponent;
    // Input base and exponent
    cout << "Enter the base number: ";
    cin >> base;
    cout << "Enter the exponent: ";
    cin >> exponent;
    // Calculate and display power
    cout << base << " raised to the power of " << exponent << " is: "
<< pow(base, exponent) << endl;
    return 0;
}
```

Solution for Question 59: Find the Absolute Value of a Number

```
#include <iostream>
#include <cmath>  // For abs() function
using namespace std;
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Calculate and display absolute value
    cout << "The absolute value of " << num << " is: " << abs(num) <<
endl;
    return 0;
}
```

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Solution for Question 60: Find the Maximum of Two Numbers

```
#include <iostream>
#include <algorithm>  // For max() function
using namespace std;
int main() {
    int num1, num2;
    // Input two numbers
    cout << "Enter the first number: ";
    cin >> num1;
    cout << "Enter the second number: ";
    cin >> num2;
    // Find and display maximum
    cout << "The maximum of " << num1 << " and " << num2 << " is: "
<< max(num1, num2) << endl;
    return 0;
}
```

Solution for Question 61: Find the Minimum of Two Numbers

```
#include <iostream>
#include <algorithm>  // For min() function
using namespace std;
int main() {
    int num1, num2;
    // Input two numbers
    cout << "Enter the first number: ";
    cin >> num1;
    cout << "Enter the second number: ";
    cin >> num2;
    // Find and display minimum
    cout << "The minimum of " << num1 << " and " << num2 << " is: " <<
min(num1, num2) << endl;
    return 0;
}
```

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User-defined functions:

Solution for Question 62: Find the Factorial of a Number

```cpp
#include <iostream>
using namespace std;
// User-defined function to calculate factorial
int factorial(int n) {
    int fact = 1;
    for (int i = 1; i <= n; i++) {
        fact *= i;
    }
    return fact;
}
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Call the factorial function
    cout << "The factorial of " << num << " is: " << factorial(num)
<< endl;
    return 0;
}
```

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Solution for Question 63: Check Even or Odd

```cpp
#include <iostream>
using namespace std;
// User-defined function to check even or odd
void checkEvenOdd(int n) {
    if (n % 2 == 0) {
        cout << n << " is even." << endl;
    } else {
        cout << n << " is odd." << endl;
    }
}
int main() {
    int num;
    // Input number
    cout << "Enter a number: ";
    cin >> num;
    // Call the checkEvenOdd function
    checkEvenOdd(num);
    return 0;
}
```

Solution for Question 64: Calculate the Area of a Circle

```cpp
#include <iostream>
#include <cmath> // For M_PI constant
using namespace std;
// User-defined function to calculate area of circle
double areaOfCircle(double radius) {
    return M_PI * radius * radius;
}
int main() {
    double radius;
    // Input radius
    cout << "Enter the radius of the circle: ";
    cin >> radius;
    // Call the areaOfCircle function
    cout << "The area of the circle is: " << areaOfCircle(radius) <<
endl;
    return 0;
}
```

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Solution for Question 65: Find the Maximum of Three Numbers

```cpp
#include <iostream>
using namespace std;
// User-defined function to find maximum of three numbers
int findMax(int a, int b, int c) {
    if (a > b && a > c) {
        return a;
    } else if (b > c) {
        return b;
    } else {
        return c;
    }
}
int main() {
    int num1, num2, num3;
    // Input three numbers
    cout << "Enter three numbers: ";
    cin >> num1 >> num2 >> num3;
    // Call the findMax function
    cout << "The maximum of the three numbers is: " << findMax(num1,
num2, num3) << endl;
    return 0;
}
```

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File handling -Text File:

Solution for Question 66: Write to a Text File

```
#include <iostream>
#include <fstream> // For file handling
#include <string>
using namespace std;
int main() {
    string text;
    ofstream outFile("output.txt"); // Create and open a text file
for writing
    if (!outFile) {  // Check if the file is open
        cout << "Error opening file!" << endl;
        return 1;
    }
    // Input text from user
    cout << "Enter text to save to the file: ";
    getline(cin, text);
    // Write text to the file
    outFile << text << endl;
    // Close the file
    outFile.close();
    cout << "Text written to the file successfully!" << endl;
    return 0;
}
```

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Solution for Question 67: Read from a Text File

```cpp
#include <iostream>
#include <fstream> // For file handling
#include <string>
using namespace std;
int main() {
    string line;
    ifstream inFile("output.txt"); // Open the text file for reading
    if (!inFile) {  // Check if the file is open
        cout << "Error opening file!" << endl;
        return 1;
    }
    // Read content of the file and display it
    cout << "Contents of the file are: " << endl;
    while (getline(inFile, line)) {  // Read each line from the file
        cout << line << endl;
    }
    // Close the file
    inFile.close();
    return 0;
}
```

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File-Handling Binary File:

Solution for Question 68: Write to a Binary File

```
#include <iostream>
#include <fstream> // For binary file handling
using namespace std;
int main() {
    int num;
    ofstream outFile("numbers.dat", ios::binary);  // Open a binary
file for writing
    if (!outFile) {  // Check if the file opened successfully
        cout << "Error opening file!" << endl;
        return 1;
    }
    // Input integers from the user
    cout << "Enter 3 integers to save to the binary file: ";
    for (int i = 0; i < 3; i++) {
        cin >> num;
        outFile.write(reinterpret_cast<char*>(&num), sizeof(num));
// Write the integer as binary
    }
    // Close the binary file
    outFile.close();
    cout << "Data written to the binary file successfully!" << endl;
    return 0;
}
```

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Solution for Question 69: Read from a Binary File

```
#include <iostream>
#include <fstream> // For binary file handling
using namespace std;
int main() {
    int num;
    ifstream inFile("numbers.dat", ios::binary);  // Open a binary
file for reading
    if (!inFile) {  // Check if the file opened successfully
        cout << "Error opening file!" << endl;
        return 1;
    }
    // Read integers from the binary file
    cout << "The numbers in the binary file are: " << endl;
    while (inFile.read(reinterpret_cast<char*>(&num), sizeof(num))) {
// Read data from the file
        cout << num << endl;
    }
    // Close the binary file
    inFile.close();
    return 0;
}
```

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Error Handling in File Operations

Solution

70. Simplified Program for Error Handling in File Operations

```cpp
#include <iostream>
#include <fstream>  // For file handling
using namespace std;

int main() {
    // Open the file for writing
    ofstream outFile("example.txt");

    // Check if the file is open
    if (!outFile) {
        cout << "Error opening the file!" << endl;
        return 1;  // Exit the program if the file can't be opened
    }

    // Write some text to the file
    outFile << "This is a simple example of file handling." << endl;

    // Close the file
    outFile.close();

    cout << "Data written to the file successfully!" << endl;

    return 0;
}
```

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Exception handling:

Solution for Question 71: Handle Division by Zero

```
#include <iostream>
#include <stdexcept>  // For exceptions
using namespace std;
int main() {
    double num1, num2;
    cout << "Enter two numbers: ";
    cin >> num1 >> num2;
    try {
        if (num2 == 0) {
            throw runtime_error("Error: Division by zero!");
        }
        cout << "The result is: " << num1 / num2 << endl;
    } catch (const runtime_error& e) {
        cout << e.what() << endl;
    }
    return 0;
}
```

Solution for Question 72: Handle Invalid Input

```
#include <iostream>
#include <stdexcept>  // For exceptions
using namespace std;
int main() {
    int num;
    cout << "Enter an integer: ";

    try {
        if (!(cin >> num)) {
            throw runtime_error("Error: Invalid input, not an
integer.");
        }
        cout << "You entered: " << num << endl;
    } catch (const runtime_error& e) {
        cout << e.what() << endl;
    }
    return 0;
}
```

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Solution for Question 73: Handle File Not Found

```cpp
#include <iostream>
#include <fstream>
#include <stdexcept>  // For exceptions
using namespace std;
int main() {
    ifstream inFile("nonexistent.txt");
    try {
        if (!inFile) {
            throw runtime_error("Error: File not found!");
        }
        cout << "File opened successfully!" << endl;
    } catch (const runtime_error& e) {
        cout << e.what() << endl;
    }
    return 0;
}
```

Solution for Question 74: Handle Negative Age Input

```cpp
#include <iostream>
#include <stdexcept>  // For exceptions
using namespace std;
int main() {
    int age;
    cout << "Enter your age: ";
    cin >> age;
    try {
        if (age < 0) {
            throw invalid_argument("Error: Age cannot be negative!");
        }
        cout << "Your age is: " << age << endl;
    } catch (const invalid_argument& e) {
        cout << e.what() << endl;
    }
    return 0;
}
```

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classes, structures, and inheritance:

Solution for Question 75: Basic Class Definition and Object Creation

```cpp
#include <iostream>
#include <string>
using namespace std;
class Person {
public:
    string name;
    int age;
    void display() {
        cout << "Name: " << name << endl;
        cout << "Age: " << age << endl;
    }
};
int main() {
    Person person1;  // Creating an object of class Person
    person1.name = "John Doe";
    person1.age = 25;

    person1.display();  // Calling the display function
    return 0;
}
```

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Solution for Question 76: Using Structures for Storing Data

```cpp
#include <iostream>
#include <string>
using namespace std;
struct Student {
    string name;
    int rollNo;
    float marks;
};
int main() {
    Student student1;  // Creating an instance of Student structure
    student1.name = "Alice";
    student1.rollNo = 101;
    student1.marks = 85.5;

    cout << "Name: " << student1.name << endl;
    cout << "Roll Number: " << student1.rollNo << endl;
    cout << "Marks: " << student1.marks << endl;
    return 0;
}
```

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Solution for Question 77: Simple Inheritance

```cpp
#include <iostream>
#include <string>
using namespace std;
class Animal {
public:
    string name;

    void display() {
        cout << "Animal name: " << name << endl;
    }
};
class Dog : public Animal {
public:
    void bark() {
        cout << name << " says Woof!" << endl;
    }
};
int main() {
    Dog dog1;
    dog1.name = "Buddy";

    dog1.display();
    dog1.bark();  // Calling method of derived class
    return 0;
}
```

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Solution for Question 78: Using Constructor in a Class

```
#include <iostream>
#include <string>
using namespace std;
class Car {
public:
    string brand;
    string model;
    // Constructor to initialize the attributes
    Car(string b, string m) {
        brand = b;
        model = m;
    }
    void display() {
        cout << "Car Brand: " << brand << endl;
        cout << "Car Model: " << model << endl;
    }
};
int main() {
    Car car1("Toyota", "Corolla");  // Creating an object with
constructor
    car1.display();
    return 0;
}
```

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Solution for Question 79: Inheritance with Constructor

```cpp
#include <iostream>
#include <string>
using namespace std;
class Vehicle {
public:
    string type;
    // Constructor of base class
    Vehicle(string t) {
        type = t;
    }
};
class Bike : public Vehicle {
public:
    string brand;
    // Constructor of derived class
    Bike(string t, string b) : Vehicle(t) {
        brand = b;
    }
    void display() {
        cout << "Vehicle Type: " << type << endl;
        cout << "Bike Brand: " << brand << endl;
    }
};
int main() {
    Bike bike1("Two-Wheeler", "Yamaha");
    bike1.display();
    return 0;
}
```

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Solution for Question 80: Using Structures and Functions

```cpp
#include <iostream>
#include <string>
using namespace std;
struct Book {
    string title;
    string author;
};
void displayBookDetails(Book b) {
    cout << "Title: " << b.title << endl;
    cout << "Author: " << b.author << endl;
}
int main() {
    Book book1 = {"C++ Programming", "Bjarne Stroustrup"};
    displayBookDetails(book1);  // Passing structure to function
    return 0;
}
```

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