1. Hello World

Question: Write a program to print "Hello World".

```
#include <iostream>
int main() {
    std::cout << "Hello World" << std::endl;
    return 0;
}
```

2. Sum of Two Numbers

Question: Write a program to add two numbers.

```
#include <iostream>
int main() {
    int a = 5, b = 10;
    int sum = a + b;
    std::cout << "Sum: " << sum << std::endl;
    return 0;
}
```

3. Find the Largest Number

Question: Write a program to find the largest of three numbers.

```
#include <iostream>
int main() {
    int a = 10, b = 20, c = 30;
    int largest = (a > b) ? ((a > c) ? a : c) : ((b > c) ? b : c);
    std::cout << "Largest: " << largest << std::endl;
    return 0;
}
```

4. Check Even or Odd

Question: Write a program to check if a number is even or odd.

```
#include <iostream>
int main() {
    int num = 5;
    if (num % 2 == 0)
        std::cout << "Even" << std::endl;
    else
        std::cout << "Odd" << std::endl;
    return 0;
}
```

5. Fibonacci Series

Question: Write a program to generate Fibonacci series up to n terms.

```
#include <iostream>
int main() {
    int n = 10, t1 = 0, t2 = 1, nextTerm;
    for (int i = 1; i <= n; ++i) {
        std::cout << t1 << ", ";
        nextTerm = t1 + t2;
        t1 = t2;
        t2 = nextTerm;
    }
    return 0;
}
```

6. Factorial of a Number

Question: Write a program to find the factorial of a number.

```
#include <iostream>
int main() {
    int n = 5;
    long factorial = 1;
    for(int i = 1; i <= n; ++i) {
        factorial *= i;
    }
    std::cout << "Factorial: " << factorial << std::endl;
    return 0;
}
```

7. Prime Number Check

Question: Write a program to check if a number is prime.

```
#include <iostream>
int main() {
    int n = 29;
    bool isPrime = true;
    if (n <= 1)
        isPrime = false;
    for (int i = 2; i <= n / 2; ++i) {
        if (n % i == 0) {
            isPrime = false;
            break;
        }
    }
    if (isPrime)
        std::cout << "Prime" << std::endl;
    else
        std::cout << "Not Prime" << std::endl;
    return 0;
}
```

8. Reverse a Number

Question: Write a program to reverse a number.

```
#include <iostream>
int main() {
    int n = 1234, reversed = 0;
    while (n != 0) {
        int digit = n % 10;
        reversed = reversed * 10 + digit;
        n /= 10;
    }
    std::cout << "Reversed: " << reversed << std::endl;
    return 0;
}
```

9. Palindrome Check

Question: Write a program to check if a number is a palindrome.

```
#include <iostream>
int main() {
    int n = 121, original = n, reversed = 0;
    while (n != 0) {
        int digit = n % 10;
        reversed = reversed * 10 + digit;
        n /= 10;
    }
    if (original == reversed)
        std::cout << "Palindrome" << std::endl;
    else
        std::cout << "Not Palindrome" << std::endl;
    return 0;
}
```

10. Sum of Digits

Question: Write a program to find the sum of digits of a number.

```
#include <iostream>
int main() {
    int n = 1234, sum = 0;
    while (n != 0) {
        sum += n % 10;
        n /= 10;
    }
    std::cout << "Sum of Digits: " << sum << std::endl;
    return 0;
}
```

11. Armstrong Number

Question: Write a program to check if a number is an Armstrong number.

```
#include <iostream>
#include <cmath>
int main() {
    int n = 153, original = n, sum = 0;
    while (n != 0) {
        int digit = n % 10;
        sum += std::pow(digit, 3);
        n /= 10;
    }
    if (original == sum)
        std::cout << "Armstrong" << std::endl;
    else
        std::cout << "Not Armstrong" << std::endl;
    return 0;
}
```

12. Swap Two Numbers

Question: Write a program to swap two numbers without using a third variable.

```
#include <iostream>
int main() {
    int a = 5, b = 10;
    a = a + b;
    b = a - b;
    a = a - b;
    std::cout << "a: " << a << ", b: " << b << std::endl;
    return 0;
}
```

13. GCD of Two Numbers

Question: Write a program to find the GCD of two numbers.

```
#include <iostream>
int main() {
    int a = 56, b = 98;
    while (a != b) {
        if (a > b)
            a -= b;
        else
            b -= a;
    }
    std::cout << "GCD: " << a << std::endl;
    return 0;
}
```

14. LCM of Two Numbers

Question: Write a program to find the LCM of two numbers.

```
#include <iostream>
int main() {
    int a = 15, b = 20, max;
    max = (a > b) ? a : b;
    while (true) {
        if (max % a == 0 && max % b == 0) {
            std::cout << "LCM: " << max << std::endl;
            break;
        }
        ++max;
    }
    return 0;
}
```

15. Leap Year Check

Question: Write a program to check if a year is a leap year.

```
#include <iostream>
int main() {
    int year = 2020;
    if (year % 4 == 0) {
        if (year % 100 == 0) {
            if (year % 400 == 0)
                std::cout << "Leap Year" << std::endl;
            else
                std::cout << "Not Leap Year" << std::endl;
        } else
            std::cout << "Leap Year" << std::endl;
    } else
        std::cout << "Not Leap Year" << std::endl;
    return 0;
}
```

16. Sum of Natural Numbers

Question: Write a program to find the sum of first n natural numbers.

```
#include <iostream>
int main() {
    int n = 10;
    int sum = (n * (n + 1)) / 2;
    std::cout << "Sum: " << sum << std::endl;
    return 0;
}
```

17. Find the Second Largest Number

Question: Write a program to find the second largest number in an array.

```
#include <iostream>
int main() {
    int arr[] = {12, 35, 1, 10, 34, 1};
    int n = sizeof(arr) / sizeof(arr[0]);
    int first = INT_MIN, second = INT_MIN;
    for (int i = 0; i < n; i++) {
        if (arr[i] > first) {
            second = first;
            first = arr[i];
        } else if (arr[i] > second && arr[i] != first) {
            second = arr[i];
        }
    }
    std::cout << "Second Largest: " << second << std::endl;
    return 0;
}
```

18. Count Vowels in a String

Question: Write a program to count the number of vowels in a string.

```
#include <iostream>
#include <string>
int main() {
    std::string str = "Hello World";
    int count = 0;
    for (char c : str) {
        c = tolower(c);
        if (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u') {
            count++;
        }
    }
    std::cout << "Number of Vowels: " << count << std::endl;
    return 0;
}
```

19. Reverse a String

Question: Write a program to reverse a string.

```
#include <iostream>
#include <string>
int main() {
    std::string str = "Hello";
    std::string reversed = std::string(str.rbegin(), str.rend());
    std::cout << "Reversed: " << reversed << std::endl;
    return 0;
}
```

20. Remove Duplicates from an Array

Question: Write a program to remove duplicates from an array.

```
#include <iostream>
#include <vector>
#include <algorithm>
int main() {
    std::vector<int> arr = {1, 2, 3, 2, 4, 1, 5};
    std::sort(arr.begin(), arr.end());
    arr.erase(std::unique(arr.begin(), arr.end()), arr.end());
    for (int num : arr)
        std::cout << num << " ";
    std::cout << std::endl;
    return 0;
}
```

21. Binary Search

Question: Write a program to implement binary search.

```
#include <iostream>
#include <vector>
int binarySearch(const std::vector<int>& arr, int l, int r, int x) {
    if (r >= l) {
        int mid = l + (r - l) / 2;
        if (arr[mid] == x)
            return mid;
        if (arr[mid] > x)
            return binarySearch(arr, l, mid - 1, x);
        return binarySearch(arr, mid + 1, r, x);
    }
    return -1;
}
int main() {
    std::vector<int> arr = {2, 3, 4, 10, 40};
    int x = 10;
    int result = binarySearch(arr, 0, arr.size() - 1, x);
    if (result != -1)
        std::cout << "Element found at index " << result << std::endl;
    else
        std::cout << "Element not found" << std::endl;
    return 0;
}
```

22. Bubble Sort

Question: Write a program to implement bubble sort.

```
#include <iostream>
#include <vector>
void bubbleSort(std::vector<int>& arr) {
    int n = arr.size();
    for (int i = 0; i < n - 1; ++i) {
        for (int j = 0; j < n - i - 1; ++j) {
            if (arr[j] > arr[j + 1]) {
                std::swap(arr[j], arr[j + 1]);
            }
        }
    }
}
int main() {
    std::vector<int> arr = {64, 34, 25, 12, 22, 11, 90};
    bubbleSort(arr);
    for (int num : arr)
        std::cout << num << " ";
    std::cout << std::endl;
    return 0;
}
```

23. Insertion Sort

Question: Write a program to implement insertion sort.

```
#include <iostream>
#include <vector>
void insertionSort(std::vector<int>& arr) {
    int n = arr.size();
    for (int i = 1; i < n; ++i) {
        int key = arr[i];
        int j = i - 1;
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            --j;
        }
        arr[j + 1] = key;
    }
}
int main() {
    std::vector<int> arr = {12, 11, 13, 5, 6};
    insertionSort(arr);
    for (int num : arr)
```

```
        std::cout << num << " ";
    std::cout << std::endl;
    return 0;
}
```

24. Selection Sort

Question: Write a program to implement selection sort.

```
#include <iostream>
#include <vector>
void selectionSort(std::vector<int>& arr) {
    int n = arr.size();
    for (int i = 0; i < n - 1; ++i) {
        int minIdx = i;
        for (int j = i + 1; j < n; ++j) {
            if (arr[j] < arr[minIdx]) {
                minIdx = j;
            }
        }
        std::swap(arr[minIdx], arr[i]);
    }
}
int main() {
    std::vector<int> arr = {64, 25, 12, 22, 11};
    selectionSort(arr);
    for (int num : arr)
        std::cout << num << " ";
    std::cout << std::endl;
    return 0;
}
```

25. Merge Sort

Question: Write a program to implement merge sort.

```
#include <iostream>
#include <vector>
void merge(std::vector<int>& arr, int l, int m, int r) {
    int n1 = m - l + 1;
    int n2 = r - m;
    std::vector<int> L(n1), R(n2);
    for (int i = 0; i < n1; ++i)
        L[i] = arr[l + i];
    for (int i = 0; i < n2; ++i)
        R[i] = arr[m + 1 + i];
    int i = 0, j = 0, k = l;
    while (i < n1 && j < n2) {
        if (L[i] <= R[j]) {
            arr[k] = L[i];
            ++i;
        } else {
            arr[k] = R[j];
            ++j;
        }
        ++k;
    }
    while (i < n1) {
        arr[k] = L[i];
        ++i;
        ++k;
    }
    while (j < n2) {
        arr[k] = R[j];
        ++j;
        ++k;
    }
}
void mergeSort(std::vector<int>& arr, int l, int r) {
    if (l < r) {
        int m = l + (r - l) / 2;
        mergeSort(arr, l, m);
        mergeSort(arr, m + 1, r);
        merge(arr, l, m, r);
    }
}
int main() {
    std::vector<int> arr = {12, 11, 13, 5, 6, 7};
    mergeSort(arr, 0, arr.size() - 1);
    for (int num : arr)
        std::cout << num << " ";
    std::cout << std::endl;
    return 0;
}
```

26. Quick Sort

Question: Write a program to implement quick sort.

```
#include <iostream>
#include <vector>
int partition(std::vector<int>& arr, int low, int high) {
    int pivot = arr[high];
    int i = (low - 1);
    for (int j = low; j <= high - 1; ++j) {
        if (arr[j] < pivot) {
            ++i;
            std::swap(arr[i], arr[j]);
        }
    }
    std::swap(arr[i + 1], arr[high]);
    return (i + 1);
}
void quickSort(std::vector<int>& arr, int low, int high) {
    if (low < high) {
        int pi = partition(arr, low, high);
        quickSort(arr, low, pi - 1);
        quickSort(arr, pi + 1, high);
    }
}
int main() {
    std::vector<int> arr = {10, 7, 8, 9, 1, 5};
    quickSort(arr, 0, arr.size() - 1);
    for (int num : arr)
        std::cout << num << " ";
    std::cout << std::endl;
    return 0;
}
```

27. Find Maximum in Array

Question: Write a program to find the maximum element in an array.

```
#include <iostream>
#include <vector>
int main() {
    std::vector<int> arr = {10, 324, 45, 90, 9808};
    int max = arr[0];
    for (int num : arr) {
        if (num > max)
            max = num;
    }
    std::cout << "Maximum: " << max << std::endl;
    return 0;
}
```

28. Find Minimum in Array

Question: Write a program to find the minimum element in an array.

```
#include <iostream>
#include <vector>
int main() {
    std::vector<int> arr = {10, 324, 45, 90, 9808};
    int min = arr[0];
    for (int num : arr) {
        if (num < min)
            min = num;
    }
    std::cout << "Minimum: " << min << std::endl;
    return 0;
}
```

29. Sum of Array Elements

Question: Write a program to find the sum of all elements in an array.

```
#include <iostream>
#include <vector>
int main() {
    std::vector<int> arr = {1, 2, 3, 4, 5};
    int sum = 0;
    for (int num : arr) {
        sum += num;
    }
    std::cout << "Sum: " << sum << std::endl;
    return 0;
}
```

30. Find the Frequency of Each Element in the Array

Question: Write a program to find the frequency of each element in an array.

```
#include <iostream>
#include <vector>
```

```
#include <unordered_map>
int main() {
    std::vector<int> arr = {1, 2, 2, 3, 3, 3, 4};
    std::unordered_map<int, int> freq;
    for (int num : arr) {
        freq[num]++;
    }
    for (auto& pair : freq) {
        std::cout << pair.first << " occurs " << pair.second << " times" <<
std::endl;
    }
    return 0;
}
```

31. Transpose of a Matrix

Question: Write a program to find the transpose of a matrix.

```
#include <iostream>
int main() {
    int row = 3, col = 3;
    int matrix[3][3] = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
    int transpose[3][3];

    for (int i = 0; i < row; ++i) {
        for (int j = 0; j < col; ++j) {
            transpose[j][i] = matrix[i][j];
        }
    }

    std::cout << "Transpose of the matrix:" << std::endl;
    for (int i = 0; i < col; ++i) {
        for (int j = 0; j < row; ++j) {
            std::cout << transpose[i][j] << " ";
        }
        std::cout << std::endl;
    }

    return 0;
}
```

32. Matrix Multiplication

Question: Write a program to multiply two matrices.

```
#include <iostream>
int main() {
    int row1 = 2, col1 = 3, row2 = 3, col2 = 2;
    int matrix1[2][3] = {{1, 2, 3}, {4, 5, 6}};
    int matrix2[3][2] = {{7, 8}, {9, 10}, {11, 12}};
    int result[2][2] = {0};

    if (col1 != row2) {
        std::cout << "Matrix multiplication not possible" << std::endl;
        return 0;
    }

    for (int i = 0; i < row1; ++i) {
        for (int j = 0; j < col2; ++j) {
            for (int k = 0; k < col1; ++k) {
                result[i][j] += matrix1[i][k] * matrix2[k][j];
            }
        }
    }

    std::cout << "Product of the matrices:" << std::endl;
    for (int i = 0; i < row1; ++i) {
        for (int j = 0; j < col2; ++j) {
            std::cout << result[i][j] << " ";
        }
        std::cout << std::endl;
    }

    return 0;
}
```

33. Find the Length of a String

Question: Write a program to find the length of a string.

```
#include <iostream>
#include <cstring>
int main() {
    char str[] = "Hello World";
    int length = std::strlen(str);
    std::cout << "Length: " << length << std::endl;
    return 0;
}
```

34. Count Words in a String

Question: Write a program to count the number of words in a string.

```
#include <iostream>
#include <string>
#include <sstream>
int main() {
    std::string str = "Hello world, welcome to C++ programming";
    std::stringstream ss(str);
    std::string word;
    int count = 0;
    while (ss >> word) {
        count++;
    }
    std::cout << "Number of Words: " << count << std::endl;
    return 0;
}
```

35. Reverse Words in a String

Question: Write a program to reverse the words in a string.

```
#include <iostream>
#include <string>
#include <sstream>
#include <vector>
```

```
int main() {
    std::string str = "Hello world, welcome to C++ programming";
    std::stringstream ss(str);
    std::string word;
    std::vector<std::string> words;
    while (ss >> word) {
        words.push_back(word);
    }
    std::reverse(words.begin(), words.end());
    for (const std::string& w : words) {
        std::cout << w << " ";
    }
    std::cout << std::endl;
    return 0;
}
```

36. Find Substring

Question: Write a program to find a substring in a string.

```
#include <iostream>
#include <string>
int main() {
    std::string str = "Hello world, welcome to C++ programming";
    std::string substr = "welcome";
    size_t found = str.find(substr);
    if (found != std::string::npos) {
        std::cout << "Substring found at index " << found << std::endl;
    } else {
        std::cout << "Substring not found" << std::endl;
    }
    return 0;
}
```

37. Replace Substring

Question: Write a program to replace a substring in a string.

```
#include <iostream>
#include <string>
int main() {
    std::string str = "Hello world, welcome to C++ programming";
    std::string oldSubstr = "world";
    std::string newSubstr = "everyone";
    size_t found = str.find(oldSubstr);
    if (found != std::string::npos) {
        str.replace(found, oldSubstr.length(), newSubstr);
    }
    std::cout << str << std::endl;
    return 0;
}
```

38. Check for Anagram

Question: Write a program to check if two strings are anagrams.

```
#include <iostream>
```

```
#include <algorithm>
#include <string>
bool areAnagrams(const std::string& str1, const std::string& str2) {
    if (str1.length() != str2.length())
        return false;
    std::string s1 = str1, s2 = str2;
    std::sort(s1.begin(), s1.end());
    std::sort(s2.begin(), s2.end());
    return s1 == s2;
}
int main() {
    std::string str1 = "listen";
    std::string str2 = "silent";
    if (areAnagrams(str1, str2))
        std::cout << "Anagrams" << std::endl;
    else
        std::cout << "Not Anagrams" << std::endl;
    return 0;
}
```

39. Count Character Frequency

Question: Write a program to count the frequency of each character in a string.

```
#include <iostream>
#include <string>
#include <unordered_map>
int main() {
    std::string str = "Hello world";
    std::unordered_map<char, int> freq;
    for (char c : str) {
        freq[c]++;
    }
    for (auto& pair : freq) {
        std::cout << pair.first << ": " << pair.second << std::endl;
    }
    return 0;
}
```

40. Remove Whitespaces

Question: Write a program to remove whitespaces from a string.

```
#include <iostream>
#include <string>
int main() {
    std::string str = " Hello World ";
    str.erase(remove(str.begin(), str.end(), ' '), str.end());
    std::cout << str << std::endl;
    return 0;
}
```

41. Check if String is Palindrome

Question: Write a program to check if a string is a palindrome.

```
#include <iostream>
```

```
#include <string>
int main() {
    std::string str = "madam";
    std::string reversed = std::string(str.rbegin(), str.rend());
    if (str == reversed)
        std::cout << "Palindrome" << std::endl;
    else
        std::cout << "Not Palindrome" << std::endl;
    return 0;
}
```

42. Check Armstrong Number for n Digits

Question: Write a program to check if a number is an Armstrong number for n digits.

```
#include <iostream>
#include <cmath>
int main() {
    int n = 9474;
    int sum = 0, temp = n, digits = 0;
    while (temp != 0) {
        digits++;
        temp /= 10;
    }
    temp = n;
    while (temp != 0) {
        int digit = temp % 10;
        sum += std::pow(digit, digits);
        temp /= 10;
    }
    if (sum == n)
        std::cout << "Armstrong" << std::endl;
    else
        std::cout << "Not Armstrong" << std::endl;
    return 0;
}
```

43. Check if Number is Prime

Question: Write a program to check if a number is prime.

```
#include <iostream>
bool isPrime(int n) {
    if (n <= 1) return false;
    for (int i = 2; i * i <= n; ++i) {
        if (n % i == 0) return false;
    }
    return true;
}
int main() {
    int n = 29;
    if (isPrime(n))
        std::cout << "Prime" << std::endl;
    else
        std::cout << "Not Prime" << std::endl;
    return 0;
}
```

44. Factorial of a Number

Question: Write a program to find the factorial of a number.

```
#include <iostream>
int factorial(int n) {
    return (n <= 1) ? 1 : n * factorial(n - 1);
}
int main() {
    int n = 5;
    std::cout << "Factorial: " << factorial(n) << std::endl;
    return 0;
}
```

45. Fibonacci Series

Question: Write a program to generate the Fibonacci series up to n terms.

```
#include <iostream>
void fibonacci(int n) {
    int t1 = 0, t2 = 1, nextTerm;
    for (int i = 1; i <= n; ++i) {
        std::cout << t1 << " ";
        nextTerm = t1 + t2;
        t1 = t2;
        t2 = nextTerm;
    }
    std::cout << std::endl;
}
int main() {
    int n = 10;
    fibonacci(n);
    return 0;
}
```

46. Sum of Digits

Question: Write a program to find the sum of the digits of a number.

```
#include <iostream>
int main() {
    int n = 1234, sum = 0;
    while (n != 0) {
        sum += n % 10;
        n /= 10;
    }
    std::cout << "Sum of digits: " << sum << std::endl;
    return 0;
}
```

47. Reverse a Number

Question: Write a program to reverse a number.

```
#include <iostream>
int main() {
    int n = 1234, reversed = 0;
    while (n != 0) {
        int digit = n % 10;
        reversed = reversed * 10 + digit;
        n /= 10;
    }
    std::cout << "Reversed number: " << reversed << std::endl;
    return 0;
}
```

48. Check if a Number is a Palindrome

Question: Write a program to check if a number is a palindrome.

```
#include <iostream>
int main() {
    int n = 121, original = n, reversed = 0;
    while (n != 0) {
        int digit = n % 10;
        reversed = reversed * 10 + digit;
        n /= 10;
    }
    if (original == reversed)
        std::cout << "Palindrome" << std::endl;
    else
        std::cout << "Not Palindrome" << std::endl;
    return 0;
}
```

49. Find GCD of Two Numbers

Question: Write a program to find the GCD of two numbers.

```
#include <iostream>
int gcd(int a, int b) {
    return (b == 0) ? a : gcd(b, a % b);
}
int main() {
    int a = 56, b = 98;
    std::cout << "GCD: " << gcd(a, b) << std::endl;
    return 0;
}
```

50. Find LCM of Two Numbers

Question: Write a program to find the LCM of two numbers.

```
#include <iostream>
int gcd(int a, int b) {
    return (b == 0) ? a : gcd(b, a % b);
}
int lcm(int a, int b) {
    return (a / gcd(a, b)) * b;
}
int main() {
    int a = 12, b = 15;
    std::cout << "LCM: " << lcm(a, b) << std::endl;
    return 0;
}
```

51. Find the Power of a Number

Question: Write a program to find the power of a number.

```
#include <iostream>
int main() {
    int base = 2, exponent = 3;
    int result = 1;
    for (int i = 0; i < exponent; ++i) {
        result *= base;
    }
    std::cout << "Power: " << result << std::endl;
    return 0;
}
```

52. Find nCr

Question: Write a program to find the binomial coefficient nCr.

```
#include <iostream>
int factorial(int n) {
    return (n <= 1) ? 1 : n * factorial(n - 1);
}
int nCr(int n, int r) {
    return factorial(n) / (factorial(r) * factorial(n - r));
}
int main() {
    int n = 5, r = 2;
    std::cout << "nCr: " << nCr(n, r) << std::endl;
    return 0;
}
```

53. Find nPr

Question: Write a program to find the number of permutations nPr.

```
#include <iostream>
int factorial(int n) {
    return (n <= 1) ? 1 : n * factorial(n - 1);
}
int nPr(int n, int r) {
    return factorial(n) / factorial(n - r);
}
int main() {
    int n = 5, r = 2;
    std::cout << "nPr: " << nPr(n, r) << std::endl;
    return 0;
}
```

54. Check if Year is Leap Year

Question: Write a program to check if a year is a leap year.

```
#include <iostream>
int main() {
    int year = 2024;
    if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0))
        std::cout << "Leap Year" << std::endl;
    else
        std::cout << "Not Leap Year" << std::endl;
    return 0;
}
```

55. Convert Decimal to Binary

Question: Write a program to convert a decimal number to binary.

```
#include <iostream>
#include <stack>
int main() {
    int decimal = 10;
    std::stack<int> binary;
    while (decimal > 0) {
        binary.push(decimal % 2);
        decimal /= 2;
    }
    std::cout << "Binary: ";
    while (!binary.empty()) {
        std::cout << binary.top();
        binary.pop();
    }
    std::cout << std::endl;
    return 0;
}
```

56. Convert Binary to Decimal

Question: Write a program to convert a binary number to decimal.

```
#include <iostream>
#include <cmath>
int main() {
    int binary = 1010;
    int decimal = 0, base = 1, temp = binary;
    while (temp > 0) {
        int lastDigit = temp % 10;
        temp /= 10;
        decimal += lastDigit * base;
        base *= 2;
    }
    std::cout << "Decimal: " << decimal << std::endl;
    return 0;
}
```

57. Convert Decimal to Hexadecimal

Question: Write a program to convert a decimal number to hexadecimal.

```
#include <iostream>
int main() {
    int decimal = 2545;
    char hex[100];
    int i = 0;
    while (decimal != 0) {
        int temp = decimal % 16;
        if (temp < 10)
            hex[i] = temp + 48;
        else
            hex[i] = temp + 55;
        decimal /= 16;
        i++;
    }
    std::cout << "Hexadecimal: ";
    for (int j = i - 1; j >= 0; j--)
        std::cout << hex[j];
    std::cout << std::endl;
    return 0;
}
```

58. Convert Hexadecimal to Decimal

Question: Write a program to convert a hexadecimal number to decimal.

```
#include <iostream>
#include <cstring>
#include <cmath>
int main() {
    char hex[100];
    std::cout << "Enter a hexadecimal number: ";
    std::cin >> hex;
    int length = std::strlen(hex);
    int base = 1, decimal = 0;
    for (int i = length - 1; i >= 0; i--) {
        if (hex[i] >= '0' && hex[i] <= '9') {
            decimal += (hex[i] - 48) * base;
            base *= 16;
        } else if (hex[i] >= 'A' && hex[i] <= 'F') {
            decimal += (hex[i] - 55) * base;
            base *= 16;
        }
    }
    std::cout << "Decimal: " << decimal << std::endl;
    return 0;
}
```

59. Generate Random Numbers

Question: Write a program to generate random numbers.

```
#include <iostream>
#include <cstdlib>
#include <ctime>
int main() {
    std::srand(std::time(0));
    for (int i = 0; i < 10; ++i) {
        std::cout << std::rand() % 100 << " ";
    }
    std::cout << std::endl;
    return 0;
}
```

60. Find the Sum of the Series

Question: Write a program to find the sum of the series 1 + 1/2 + 1/3 + ... + 1/n.

```
#include <iostream>
int main() {
    int n = 10;
    double sum = 0.0;
    for (int i = 1; i <= n; ++i) {
        sum += 1.0 / i;
    }
    std::cout << "Sum: " << sum << std::endl;
    return 0;
}
```