

**Introduction to Basic Data Structures**

**Module 2: Practice Problem**

**Problem 1: Basic Vector Initialization**

**Description:** Write a C++ program to initialize a vector with the integers from 1 to N and print the elements.

|  |  |
| --- | --- |
| Input | Output |
| 10 | 1 2 3 4 5 6 7 8 9 10 |

**Problem 2: Vector Initialization with a Fixed Value**

**Description:** Write a C++ program to initialize a vector of size 5 with all elements set to the value N and print the elements.

|  |  |
| --- | --- |
| Input | Output |
| 7 | 7 7 7 7 7 |

**Problem 3: Vector Initialization from an Array**

**Description:** Write a C++ program to initialize a vector from an array of integers and print the elements. The array is: {10, 20, 30, 40, 50}.

|  |  |
| --- | --- |
| Input | Output |
|  | 10 20 30 40 50 |

**Problem 4: Vector Capacity Functions**

**Problem Statement:**

Write a C++ program that demonstrates the use of various vector capacity-related member functions. Your program should perform the following steps:

1. **Initialize a Vector:**
   * Initialize a vector with integers from 1 to 10.
2. **Print Initial Vector Properties:**
   * Print the size, capacity, and maximum size of the vector.
3. **Resize the Vector:**
   * Resize the vector to hold 20 elements, initializing new elements with the value 0.
   * Print the size and capacity after resizing.
4. **Clear the Vector:**
   * Clear the vector elements using the clear() function.
   * Print the size and capacity after clearing.
5. **Check if the Vector is Empty:**
   * Check if the vector is empty using the empty() function and print the result.
6. **Resize to Original Size:**
   * Resize the vector back to its original size (10) and fill with the value 100.
   * Print the size, capacity, and elements of the vector after resizing.

**Problem 5: Find and Replace**

**Problem Statement:**

You are given a vector of integers. Your task is to write a C++ program that performs the following operations:

1. Replace all occurrences of a given value in the vector with another given value.
2. Find the position of the first occurrence of a specific value in the vector.

**Input Format:**

1. An integer n denoting the number of elements in the vector.
2. n space-separated integers representing the elements of the vector.
3. Two integers old\_val and new\_val where all occurrences of old\_val in the vector need to be replaced with new\_val.
4. An integer find\_val for which you need to find the first occurrence in the vector.

**Output Format:**

1. Print the modified vector after the replacement operation.
2. Print the index of the first occurrence of find\_val in the vector. If find\_val is not found, print -1.

|  |  |
| --- | --- |
| Input | Output |
| 10  1 2 3 2 4 2 5 2 6 2  2 9  5 | 1 9 3 9 4 9 5 9 6 9  6 |

**Problem 6: Captalize The First Character of a Word**

You are given n strings. Your task is to capitalize the first character of each string and print the modified strings.

**Note:** Solve the problem using vector

|  |  |
| --- | --- |
| Input | Output |
| 3  hello  world  example | Hello  World  Example |