



# 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: Capitalize 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