Lab exercises

Exercise 1

You are given a vector of strings v containing parts of a sentence. Your task is to reconstruct the original sentence by concatenating these parts. However, there are extra spaces in some parts of the sentence that need to be removed. Additionally, you need to find the position of the word "very" in the sentence and concatenate the parts before and after it separately. Finally, you should assert that the reconstructed sentence matches the expected output. Write a C++ program to solve this problem.

Exercise 2

You are given a vector of integers v and an integer target. Your task is to find all pairs of elements in v that sum up to target. If no such pairs exist, return an empty view. Write a C++ program to solve this problem using ranges and views.

```
Sample input:
v = {2, 7, 11, 15, 3, 6, 4, 5}
target = 9

Sample output:
```

Exercise 3

Implement a function that generates a sequence of integers starting from a given value start and incrementing by a given step step. The function should return a vector containing the generated sequence.

Input

start: An integer specifying the starting value of the sequence. step: An integer specifying the increment value for each element in the sequence.

Output A vector of integers containing the generated sequence.

```
// Input
int start = 1;
int step = 2;

// Output
The function should return a vector: {1, 3, 5, 7, 9}
```

Exercise 4

Write a function template palindrome that takes a vector parameter and returns true or false according to whether the vector does or does not read the same forward as backward (e.g., a vector containing 1, 2, 3, 2, 1 is a palindrome, but a vector containing 1, 2, 3, 4 is not).

Exercise 5

You are given three arrays, a1, a2, and a3, each containing SIZE integers. You need to perform the following tasks:

1. Print the contents of arrays a1, a2, and a3.

2. Determine if array a1 is equal to array a2 and print the result.
3. Determine if array a1 is equal to array a3 and print the result.
4. Find the first mismatch between arrays a1 and a3, and print the index of the mismatch along with the corresponding values from a1 and a3.
5. Compare two character arrays, c1 and c2, and determine if c1 is lexicographically less than c2. Print the result.

You may use the following functions from the C++ Standard Library:

std::equal to compare arrays for equality.

std::mismatch to find the first mismatch between two arrays.

std::lexicographical_compare to compare two character arrays lexicographically.

Ensure to include the necessary headers and use the appropriate iterators for array traversal.

```
Sample Output:

a1 contains: 1 2 3 4 5 6 7 8 9 10
a2 contains: 1 2 3 4 5 6 7 8 9 10
a3 contains: 1 2 3 4 1000 6 7 8 9 10

a1 is equal to a2.
a1 is not equal to a3.

There is a mismatch between a1 and a3 at location 4
where a1 contains 5 and a3 contains 1000.

HELLO is less than BYE BYE
```

Exercise 6

You are given an array of integers. Perform the following operations:

1. Remove all occurrences of the number 10 from the array.
2. Copy all elements from another array to a new array, removing all occurrences of the number 10 in the process.
3. Remove all elements greater than 9 from the array.
4. Copy all elements from another array to a new array, removing all elements greater than 9 in the process.

Write a program that performs these operations and prints the arrays before and after each operation.

```
sample input:

Array 1: 10, 2, 10, 4, 16, 6, 14, 8, 12, 10
Array 2: 10, 2, 10, 4, 16, 6, 14, 8, 12, 10

sample output:

a1 before removing all 10s: 10 2 10 4 16 6 14 8 12 10
```

```
a1 after removing all 10s: 2 4 16 6 14 8 12

a2 before removing all 10s and copying: 10 2 10 4 16 6 14 8 12 10
c after removing all 10s from a2: 0 2 0 4 16 6 14 8 12 0

a3 before removing all elements greater than 9: 10 2 10 4 16 6 14 8 12 10
a3 after removing all elements greater than 9: 2 4 6 8

a4 before removing all elements greater than 9 and copying: 10 2 10 4 16 6 14 8 12 10
c2 after removing all elements greater than 9 from a4: 0 2 0 4 6 8 0
```

Exercise 7 .....

You are given two arrays, a1 and a2, each containing integers. Perform the following operations:

Display the elements of a1 and a2. Use the copy_backward algorithm to copy elements from a1 to a new array called results, starting from the end of results. Merge the elements of a1 and a2 into a new array called results2. Remove duplicates from results2. Reverse the elements of a1 in-place. Display the resulting arrays after each operation.

```
Input:

Two arrays of integers, a1 and a2.

Output:

Display the elements of a1 and a2.
Display the elements of results after copy_backward.
Display the elements of results2 after merging.
Display the elements of results2 after removing duplicates.
Display the elements of a1 after reversing in-place.
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