Q-1: You are tasked to write a Program to find the sum of elements above and below the main diagonal of a matrix.

Sample test case:

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| Input: {{1, 2, 3},  {4, 5, 6},  {7, 8, 9}}  Output:  Sum above diagonal: 11  Sum below diagonal: 19 |

Q-2: Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target.

You may assume that each input would have exactly one solution, and you may not use the same element twice. You can return the answer in any order.

Sample test case:

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| --- |
| Input: nums = [2,7,11,15], target = 9  Output: [0,1] |

Q-3: In a high school mathematics class, the teacher is introducing the concept of matrix transposition to the students.

Students are tasked to find transpose of matrix. Write a Program to help students.

Sample test case:

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| Input: matrix= {{1, 2},{3, 4},{5, 6}}  Output:  Transpose of the matrix:  1 3 5  2 4 6 |
|  |

Q-4: Students are arranged in matrix form for assembly.

Help coach to find the maximum height student in each row of a students.

Sample test case:

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| --- |
| Input: {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}}  Output:  Maximum element in row 1: 3  Maximum element in row 2: 6  Maximum element in row 3: 9 |

Q-5: In a school's annual sports event, the coach wants to determine the second-highest score achieved by the students in the long jump competition.

The coach asks each participant to perform a long jump and records their distances in meters.

The distances are stored in an array, and the coach needs a program to find the second largest distance among all the recorded jumps.

Sample test case:

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| Input: {5, 9, 3, 7, 1}  Output: Second Largest element: 7 |

Q-6: Given an array of integers containing only 0s and 1s,write a program to segregate the 0s and 1s in the array, where all the 0s should come before all the 1s.

Sample test case:

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| Input: {1, 0, 1, 0, 1, 0, 0, 1}  Output: Segregated Array: 0 0 0 0 1 1 1 1 |

Constraints:

* Input array should contain only 0 and 1.

Q-7: Given an array of integers, write a program to find the maximum product of two integers in the array.

Sample test case:

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| --- |
| Input: {1, 2, 3, 4, 5}  Output: Maximum Product: 20 |

Q-8: Given an array of integers, write a program to find the length of the longest increasing subarray in the array.

Sample test case:

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| Input: {5, 6, 3, 5, 7, 8, 9, 1, 2}  Output: Length of Longest Increasing Subarray: 5 |

Q-9: Program to find the equilibrium index of an array,

where the equilibrium index is the position where the sum of elements to the left is equal to the sum of elements to the right.

Sample test case:

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| Input: {-7, 1, 5, 2, -4, 3, 0}  Output: Equilibrium Index: 3 |

Q-10: Program to find the maximum difference between two elements in an array,

where the larger element appears after the smaller element:

Sample test case:

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| --- |
| Input: {2, 3, 10, 6, 4, 8, 1}  Output: Maximum Difference: 8 |

Q-11: In a school, the teacher wants to calculate the average test score of a group of students. The teacher has already collected the test scores of each student and stored them in an array. However, to save memory and improve performance, the teacher decides to use pointers to calculate the average instead of copying the entire array.

Give a program to fulfill teacher's requirements.

Sample test case:

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| --- |
| Input: 1, 2, 3, 4, 5  Output: Average of array elements: 3 |

Q-12: Emma, a student, has been assigned a task by her computer science teacher.

The task is to write a program that counts the number of words in a given string.

To make it more interesting, her teacher challenges her to use pointers in the program.

Help Emma to complete the task.

Sample test case:

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| --- |
| Input: "Hello, how are you?"  Output: Number of words: 4 |

Q-13: In a retail store, the manager wants to calculate the total sales made in a day.

The sales data is stored in an integer array. Instead of using the traditional indexing method, the store manager decides to challenge the sales team to use pointer arithmetic to calculate the total sales.

Sample test case:

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| --- |
| Input: {1, 2, 3, 4, 5}  Output: Sum of array elements: 15 |

Q-14: Given two integers A and B. The task is to swap two numbers. Swapping here means to interchange the values of A and B.

Sample test case:

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| --- |
| Before swap - x: 10, y: 20  After swap - x: 20, y: 10 |

Q-15: Write a CPP function to Increment each element of an integer array by 1 by using pointer arithmetic operation.

Sample test case:

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| --- |
| Input: {1, 2, 3, 4, 5}  Output: Modified array: 2 3 4 5 6 |

Q-16: Write a program that takes an array, its size, and the number of rotations as input, and rotates the array left by the given number of positions using pointer arithmetic. Output the rotated array.

Sample test case:

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| --- |
| Input:  Enter the size of the array: 6  Enter the elements of the array: 2 3 6 4 1 2  Enter the number of rotations: 2  Output: Rotated array: 6 4 1 2 2 3 |

Q-17: In a language learning application, a new word game called "Palindromic Word Detector" is introduced to challenge users' language and programming skills. The game requires users to enter a word, and the application will check if the word is a palindrome using pointers.

Sample test case:

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| --- |
| Input: Madam  Output: Palindrome |

Q-18: We have two sorted arrays, it needs to be merged into a single sorted array.

Write a program to merge two sorted arrays using dynamic memory allocation and pointers.

Sample test case:

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| --- |
| Input: arr1= 2 4 6, arr2=3  Output:  Merged Array: 1 2 3 4 6 |

Constraints:

* Input array should be in sorted form only.