

Exercise 1. Write a C program allow to fill a array of 10 boxes so that the value contained in each box is the number of that box, and to display it.

Exercise 2. Write a C program that reads an array of 10 integers and determines whether all elements are positive or zero.

Exercise 3. Write a C program allow to fill a table of 20 boxes so that box i will contain the sum of the values from 0 to i , and to display it.

Example:

0	1	2	3	4	5		i
0	1	3	6	10	15	...	$\sum_{j=0}^i j$

Exercise 4. Write a C program that reads an array of 6 integers and calculates the sum, minimum, and maximum of the array.

Exercise 5. Write a C program that allows you to enter two arrays T1 and T2 of N integer elements, then display all the elements common to these two arrays, as well as the number of these elements.

Exercise 6. Write a C program that allows you to enter arrays T1 of N integer elements, then reverse it and print it.

Exercise 7. Write a C program that lets the user input 10 integers into an array. The program should put positive numbers at the beginning of the array and negative numbers at the end of the array, and then display the array.

Exercise 8. Write a program in C to enter the array T and display all the peaks in the array T, as well as their indices and the number of peaks.

Example: $N = 10$, $T = (0, 3, -1, -2, 7, 5, 10, 8, 11, 34)$. Your algorithm should display:

- 3 is a peak at index 2
- 7 is a peak at index 5
- 10 is a peak at index 7
- There are 3 peaks in this array.

Exercise 9. Write a C program that lets the user input 6 non-zero integers into an array and another number x . The program should check if x is in the array. If x is found, remove its first occurrence, shift the rest of the numbers to the left, and add 0 at the end. Then, display the updated array.

Example: if the value to delete is $x = 8$

0	1	2	3	4	5		0	1	2	3	4	5
3	1	8	1	2	8	→	3	1	1	2	8	0

Exercise 10. Write a C program that allows a teacher to enter the exam scores of a group of 20 students, stores them in an array, calculates the group's average, and determines the minimum and maximum score in the group, and the number of scores that are equal to or higher than the group's average.

Exercise 11. Write a C program that reads two matrices A and B of the same dimensions 3 and 2 and performs the addition of the two matrices. The result of the addition will be assigned to matrix C, which will then be displayed.

Exercise 12. Write a C program that allows the user to read the matrices A and B, then calculates and displays the matrix C, such that $C = A * B$.

Exercise 13. Write a C program that rotates a matrix by 90° .

The rotation of a matrix involves two steps:

- First, find the transpose of the given matrix.
- Swap the elements of the first column with the last column (if the matrix is of 3×3). The second column remains the same.

Note: Matrix must have the same number of rows and columns.

$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{bmatrix}$	$\xrightarrow[\text{(1)}]{\text{Transpose}}$	$\begin{bmatrix} 1 & 5 & 9 & 13 \\ 2 & 6 & 10 & 14 \\ 3 & 7 & 11 & 15 \\ 4 & 8 & 12 & 16 \end{bmatrix}$	$\xrightarrow[\text{(2)}]{\text{After Swapping}}$	$\begin{bmatrix} 13 & 9 & 5 & 1 \\ 14 & 10 & 6 & 2 \\ 15 & 11 & 7 & 3 \\ 16 & 12 & 8 & 4 \end{bmatrix}$
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