

## Practice problems

1. You will be given a integer input n. All you need to do is to print the first n numbers. However, you have to do it using a function. Your function will return an array of first n odd integers. You need to dynamically allocate memory to the array in the main function and pass it as a parameter of the function. You have to use pointer arithmetic to access the array elements everywhere.

Sample input	Corresponding output
5	1 3 5 7 9
7	1 3 5 7 9 11 13
2	1 3

2. Write a program to find the position of an element in a 2D matrix. You will be given two integer m, n denoting the row and column of the matrix. Then you have to take m\*n integer as input (row wise). After that, you will take input a number k. You have to find the position of the number (row\_no, column\_no) in the matrix (assume both row and column start from 1). If the number is found multiple times, you need to print all the positions in a separate line. If the number is not found, you have to print -1.

You have to dynamically allocate the 2D array. In addition, you need to use pointer to access the matrix elements.

Sample input	Corresponding output
2 3 1 3 -1 3 5 2 -1	1 3
2 3 1 3 -1 3 5 2 3	1 2 2 1
2 3 1 3 -1 3 5 2 6	-1

3. Write a function `char *mystrstr( char *str1, char *str2)`, which finds the first occurrence of the substring **str2** in the string **str1**. The terminating '\0' characters are not compared.

**Parameters:**

**str1**-- This is the main C string to be scanned.

**str2** -- This is the small string to be searched with-in **str1** string.

**Return Value:**

This function returns a pointer to the first occurrence in **str1** of any of the entire sequence of characters specified in **str2**, or a null pointer if the sequence is not present in **str1**.

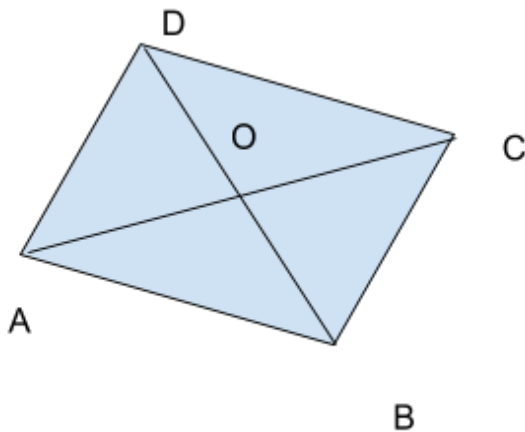
**Restriction:** You have to use Pointer syntax for implementing mystrstr function. You cannot declare any temporary char array in this function. You cannot use any function declared in <string.h>.

Sample Input	Sample Output
CSE 102 CSE B Section CSE B	CSE B Section
AAABCD AABC	AABCD
ABBCCDD BBCCAA	NULL
ABBBBCDDD DDD	DDD

4. Given three points (D,A, B in sequence) of a parallelogram find the fourth one and the area of it. The algorithm is given for your conveniences.

$$O = (B+D) / 2.$$

$$C = O + (O-A). \text{ Area} = (B-A) \times (D-A)$$



Now, you have to implement the following steps to do the desired task.

- Implement a Point structure with two double attributes x, y.
- Implement Point addPoint(Point a, Point b) that returns the addition of two points.
- Implement Point subPoint(Point a, Point b) that returns the subtraction of two points.

- Implement `Point scalePoint(Point a, double n)` that returns the point after scaling by  $n$ .
- Implement a `Parallelogram` structure with three `Point` attributes  $A, B, D$ .
- Implement `Point findFourthPoint(Parallelogram p)` that returns the fourth point of the parallelogram  $p$ . Follow the method discussed above.
- Implement `double crossPoint(Point a, Point b)` that returns the cross product of point  $a$  and  $b$ .
- Implement `double area(Parallelogram p)` that returns the area of the parallelogram.