

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 |
|------------------------------|----------------------|
| 3 2 1 3 -1 3 5 2 -1 | 1 3 |
| 3 2 1 3 -1 3 5 2 3 | 1 2 2 1 |
| 3 2 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**.

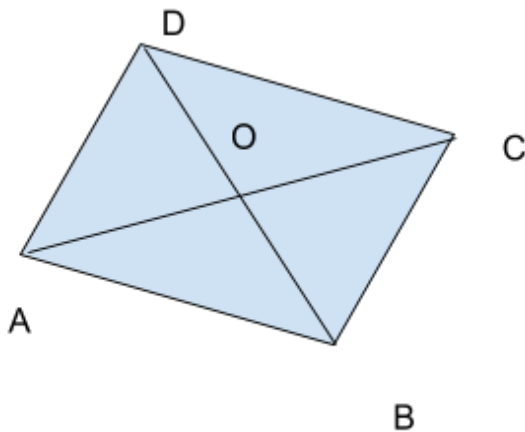
Restriction: You have to use Pointer syntax for implementing mystrstr function. You cannot declare any temporary char array in this function. You cannot use any function declared in <string.h>.

| Sample Input | Sample Output |
|--------------------------------|---------------|
| CSE 102 CSE B Section EEE C | CSE B Section |
| AAABCD AABC | AABCD |
| ABBCCDD BBCCAA | NULL |
| ABBBBCDDD DDD | DDD |

4. Given three points 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.