

1. You are given an array A with n intergers (positive, negative, and/or zero) and a number x. Find out all the sub set of A of size 3 whose sum is x. Define function for the computation.

Example: Input: A = {30, 20, -10, 0, -10}
 n = 5, x = 10
 Output: (30, -10, -10), (20, -10, 0)

2. Design tic tac toe game. You should alternatively enter 0 and 1 atmost 8 times. Whenever you find a match, print the winner 0 or 1. Otherwise print match draw.

The position map is as follows:

(0,0),(0,1),(0,2)
 (1,0),(1,1),(1,2)
 (2,0),(2,1),(2,2)

Example: Input: Choose 0 by entering 0 or 1 by entering 1: 1
 You are the 1st player. Enter the position (x,y) for
 1: 0 0
 You are the 2nd player. Enter the position (x,y) for
 0: 1 1
 You are the 1st player. Enter the position (x,y) for
 1: 2 2
 You are the 2nd player. Enter the position (x,y) for
 0: 0 2
 You are the 1st player. Enter the position (x,y) for
 1: 2 0
 You are the 2nd player. Enter the position (x,y) for
 0: 1 0
 You are the 1st player. Enter the position (x,y) for
 1: 2 1
 Output: Winner is 1st player.

3. You have aged family member at your home. He has some eye problem. That's why he is not properly able to see the numbers in his mobile phone. You are a new programmer. You plan to help him by enlarging the numbers.

Example: Input: Enter the mobile no: 9805320108

Output: @@@@ @@@@@ @@@@@ @@@@@ @@@@@ @@@@@ @@@@@ @ @@@@@ @@@@@
 @ @ @ @ @ @ @ @ @ @
 @@@@ @@@@@ @ @ @@@@@ @@@@@ @@@@@ @ @ @ @ @@@@@
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4. You are given an array A with n intergers (positive, and/or

netative). You need to sort the numbers in such a way so that the negative numbers sorted in decending order followed by 0 and finally the positive numbers in ascending order.

Example: Input: A = {30, 20, -10, 50, -20}

n = 5

Output: A = {-10, -20, 0, 20, 30, 50}

5. You are given an array A with n distinct integers. Your task is to find the next greater odd element for each even element of the array and next lesser even element for each odd element of the array. If no such element found, print 0.

Example: Input: A = {2, 5, 7, 4}

n = 4

Output: A = {5, 4, 4, 0}

6. Student marks database

Create a student marks database using structures. You should take input

1. Student Name
2. Roll number
3. Marks in Maths
4. Marks in Physics
5. Marks in Chemistry

Calculate the average marks and store the marks in the same database. Then sort the students by their average marks and print the list of students.

For sorting, use selection sort.

7. Recursive search

Create a recursive sorting program according to the algorithm below

```
recSearch(array, x) = 0 ,   array is empty OR array[0] is x
                      1 + recSearch(array + 1, x) ,
array[0] is not x
```

The function returns length of list if the element is not found.

Using the recusive search, find how many times a single element is occurring.

Example :

```
Enter array size : 9
Enter array : 6,7,4,6,1,4,5,9,4
Enter element to be searched : 4
The element has occurred 3 times
```

PS : The recursive search quits the moment it finds the first element

So you need to resubmit the array to the function multiple times. You cannot modify the recursive search function. Think carefully about how to resubmit the array.

8. Missing elements

Take input from user an array of size l , where l is taken from user.

Say the lowest number in the array is p and the highest number in the array is q , then print all the numbers between p and q such that the numbers are not in the array.

9. Neighbours of primes

Function 1 - primeCheck(x) - returns 1 if x is prime and 0 if non prime

Function 2 - searchNum(l, y) - returns 1 if y is present in array l

Take an array as input from user. Find all prime numbers in the array as well as their neighbours using functions 1 and 2.

Neighbour of p are the numbers $p+1$ and $p-1$.

You are not allowed to sort the array.

Example :

```
Enter array size : 9
Enter array : 6 3 8 7 9 5 20 18 19
Answer:
    Prime : 3
    Prime : 7
        Neighbour : 8
        Neighbour : 9
    Prime : 5
        Neighbour : 6
    Prime : 19
        Neighbour : 19
        Neighbour : 20
```

10. (Question requires knowledge of Arrays, Structure, Searching, Sorting)

Construct an employee database for an organisation named 'Angry Birds', containing following information:

a. employee id (first 2 digit indicate year of joining, middle two characters represent department namely HR, QA, SD and last two digit contains the serial number in that department in increasing order)

ex: 15HR01: employee joinined in 2015, has HR department and is the first employee in this department.)

b. employee name

c. age [20<= age => 60]

d. city [delhi, hyderabad, mumbai]

e. pin code (6 digits)

f. salary (10 digits)

g. designation (EX, MN, EM, VP)

All the constraints in the fields of database should be checked programmatically, also company have atmost 100 employees. Your program should display following choices each time to the user, untill user wants to exit, and display the result accordingly.

1. Insert data in the database.

2. Print employee name and designation in sorted order with respect to employee id.

3. Display the name and designation of employee living in a certain city, user will provide the city after choosing this option, in case of no employee it should display 'no results found'.

4. Display all the details of an employee having a certain salary and it should be sorted with respect to the city of the employee, user will provide salary after choosing this option, in case of no employee it should display 'no results found'.

5. Display the name and designation of employee going to retire in next five years (age >= 56 and age <=60), in case of no employee it should display 'no results found'.

6. Calculate the mean of the salary of all the employee in the organisation and now display the detail(s) of the those employee whose salary is nearest to the mean salary. Do the same for median and mode.

7. Exit

11. (Question requires knowledge of recursion and functions)

Write a recursive program to check if a string is palindrome or not. User will provide the string.

Ex: 'ababa' is a palindrome but 'abc' is not a palindrome.

12. (Question requires knowledge of functions)

Write a program that converts the integer in decimal into integer in some other base. User will provide number and in the base to be converted.

Ex: 10 converted in base 2, output is 1010

10 converted in base 7, output is 13

13. (Question requires knowledge of functions)

Write a program that contains a function that converts integer into null-terminated string in some other base. User will provide the string and in the base to be converted.

Ex: 10 converted in base 2, output is "1010"

10 converted in base 7, output is "13"

14. Given an array, reverse every sub-array formed by consecutive k elements.

Examples: Input: arr = [1, 2, 3, 4, 5, 6, 7, 8, 9] k = 3

Output: [3, 2, 1, 6, 5, 4, 9, 8, 7]

15. Write a C program for add, subtract, multiply and divide two complex numbers. Declare proper structure for complex number and use function to perform each operation.

16. Write a program to print a bar graph of character of the lengths of words in its input.

EX: I Hate C programming

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17. Caesar Cipher

Caesar, the Roman emperor, has sent you a secret message.

However, to prevent

anyone else from possibly reading it, two layers of encryption have been applied

upon the original message.

First, the message is reversed. Thus, the first character becomes the last, the second becomes the penultimate, and so on. For example, if Caesar wanted to say HELLO, he would actually write it as OLLEH.

Second, the message is encoded by shifting each character from the ASCII table to the right by one place. For example, if the original message is ABCD, it would be encoded as BCDE. Similarly, 1234 would be encoded as 2345.

Combining these two techniques, the HELLO message becomes PMMFI. Based on these, can you decode the following message sent by Caesar? The message is case sensitive.

"fope!mmfX

The above string is 10 characters long. Don't forget to terminate strings with null characters. You don't have to worry about the boundary case where the character with ASCII value 127 becomes the one with value 0.

Hint 1: Use an array to store the characters of the given string.
Hint 2: Think about how characters, integers, and the ASCII table are related.

18. Given a string, the task is to find whether it contains an additive sequence or not. A string contains an additive sequence if its digits can make a sequence of numbers in which every number is addition of previous two numbers. A valid string should contain at least three digit to make one additive sequence.

Examples:

Input : s = "235813"

Output : true

2 + 3 = 5, 3 + 5 = 8, 5 + 8 = 13

Input : s = "199100199"

Output : true

1 + 99 = 100, 99 + 100 = 199

Input : s = "12345678"

Output : false

19. Given an array of positive numbers, find the maximum sum of a subsequence with the constraint that no 2 numbers in the sequence should be adjacent in the array. So 3 2 7 10 should return 13 (sum of 3 and 10) or 3 2 5 10 7 should return 15 (sum of 3, 5 and 7). Examples:

Input : arr[] = {5, 5, 10, 100, 10, 5}

Output : 110

Input : arr[] = {1, 2, 3}

Output : 4

Input : arr[] = {1, 20, 3}

Output : 20

20. Given an array which is sorted, but after sorting some elements are moved to either of the adjacent positions, i.e., arr[i] may be present at arr[i+1] or arr[i-1]. Write an efficient function to search an element in this array. Basically the element arr[i] can only be swapped with either arr[i+1] or arr[i-1]. For example consider the array {2, 3, 10, 4, 40}, 4 is moved to next position and 10 is moved to previous position.

Examples:

Input: arr[] = {10, 3, 40, 20, 50, 80, 70}, key = 40

Output: 2

Output is index of 40 in given array

Input: arr[] = {10, 3, 40, 20, 50, 80, 70}, key = 90

Output: -1

-1 is returned to indicate element is not present

21. You are given a sorted array of n integers and a value m. You need to find l closest values to m in that array.

Example: Input: n=19, l = 4, m = 30

array =

{2,4,5,6,8,9,11,14,15,17,19,22,26,33,35,37,39,41,44}

Output: 26,33,35,37

22. You are given an array and a value n. You need to find the pair of elements of the array whose sum is closest to n.

Example: Input: array = {31,40,34,11,5,25}, n = 46

Output: 5 and 40

23. We have a set of intervals from which we need to check if any two intervals overlap. Here, an interval is represented as a combination of start time and end time.

Input: array = {{11,13}, {15,18}, {12,14}, {26,28}}

Output: true

The intervals {11,13} and {12,14} overlap.

24. Consider an array of distinct numbers sorted in increasing order. Then, the array has been rotated (anti-clockwise) m number of times. Given such an array, find the value of m. Write a recursive function for that.

Examples:

Input : array = {14, 17, 1, 2, 4, 11}

Output: 2

Explanation : Initial array was {1, 2, 4, 11, 14, 17}. We get the given array after rotating the initial array twice.

25. Given a string , print the reverse of the string using recursion.

26. Given an array S of n integers, find three integers in S such that the sum is closest to a given number, target. Return the sum of the three integers.

Example:

given array S = {-1 2 1 -4},
and target = 1.

The sum that is closest to the target is 2. (-1 + 2 + 1 = 2)

27. Implement the StrStr function in C. I.e. Write the source code for StrStr function.

28. Find the approximate cube root of a integer using binary search with-in the accuracy of 0.1 .

29. Write a function that given a string, Checks if the letters in a string can be re-arranged in such a way that it becomes a palindrome.

For eg. dda -> Yes (dad)

bad-> No

