COMPUTER PROGRAMMING (MONSOON 2022)

ASSIGNMENT PROBLEMS – 06 (JANUARY 04, 2023) CODE: assign06

NOTES: You must use gcc compiler under Ubuntu OS

i) Please carefully read all assignment problems and answer in a single c file. You must invoke all functions from main program and write additional functions as necessary

ii) Create a .c file by strictly following the file name convention: If the last 3 digits of your roll number is 071 & code is assign06, then the file name should be 071-assign06.c

iii) If you do not follow the above instruction, your file will not be evaluated.

PROBLEMS **[Total Marks: 30]**

1) **[Marks: 3]** Write a function to check whether a given string of length k is an odd palindrome or not? This function should return 1, if the given string is an odd palindrome and 0, otherwise.

2) **[Marks: 4]** Generate an array of n (choose any n in [20, 30]) integers.
Write a function to find (a) the smallest even numbers, (b) the largest even number and (c) the greatest common divisors (GCD) these two numbers.

3) **[Marks: 7]** Take an array of 20 integers as given below:

2	15	7	6	3	8	22	41	23	4	18	13	5	27	47	12	11	23	10	9

Now write functions to find the sum of a pair of consecutive prime numbers whose sum is also present in the array. To do this task, you may do the following:

a) Write a function to take the first prime number that appears in the array and find the next prime number consecutive to the first prime number. Add their sum and check whether the sum is present in the array or not? (Hint: Here 3 and 5 are consecutive prime numbers whose sum (= 8) is present in the array)

b) Repeat the same for all pairs of prime numbers in the array and print the pairs of consecutive prime number and their sum.

4) **[Marks: 6]** Assume the following integer array:

1	3	4	5	6	2	3	8	7	6	5	4	3	2	3	4	2	5	1	8	9	4	3	2	1	5	2	6	7	8

Find a subarray of length 3 whose reverse order can also be found in the same array. For example, the sub-array 4 5 6 appears as 6 5 4 (found in the same array). Print the start and end positions of all such sub-arrays and its reverse order in the array.

5) **[Marks: 10]** Assume a square matrix of order n (n can be assumed in [5, 10]) and store them as an array A using row major order. Now using random number generator, generate integers in [10, 30] as the elements of A.
Now the task is to find the following:

a) Write a function to find a sub-matrix of order 3 of A, whose center element is an even number. Inputs to this function would be:
   i) One-dimensional array A
   ii) The index k, the starting index of the square matrix of order 3.
   iii) Find all such 3 x 3 sub-matrices and print the same.

b) Write a function to compute the row and column sum of such sub-matrices and print the same.

Hint: Use the trick: the array index of any element can be used to derive row and column index of a square matrix of order 3. Let A be a square matrix of order 5. An element at A[8] can be seen as A[1][3]. Use this to find sub-matrices.

Deadline to upload your solutions in Google Classroom:
Saturday, January 07, 2023 on or before 23:59 Hrs

Google Classroom