

## PSCP Assignment-5 (Section-C)

**Due Date: 07/02/2021**

**Note: Please carry print out of this sheet to lab.**

1. Given an array **A[]** and positive integer **K**, write a program to count total number of pairs in the array whose sum is divisible by **K**.

Input : **A[]** = {2, 2, 1, 7, 5, 3}, **K** = 4

Output : 5

There are five pairs possible whose sum is divisible by '4' i.e., (2, 2), (1, 7), (7, 5), (1, 3) and (5, 3)

2. Write a program to compute even parity check bit ( $p_c$ ), for the given message word  $M = m_0m_1m_2...m_{n-1}$ . The message and parity check bits are binary (0 or 1). The parity check bit is generated based on the number of ones present in message. If the number of ones in the message is odd, then parity check bit is 1 otherwise it is zero. Assume the message is loaded into an array  $m$  such that each array element carries one message bit ( $m[0] = m_0, m[1] = m_1, \dots$ ), and size of the message is specified through user input via keyboard. After generating the parity check bit from the message, the code word will be generated by inserting the parity check bit at the beginning of the array (codeword  $C = p_cm_0m_1m_2 \dots m_{n-1}$ ). *Note: You should not use any additional array.* A sample input and corresponding output are given below.

**Input:** Enter the size of message = 6

Enter the message bits 1 0 1 0 1 1

**Output:** Codeword = 0101011

3. A man wanted to get into his work building, but he had forgotten his code. However, he did remember five clues. These are what those clues were: The fifth number plus the third number equals fourteen. The fourth number is one more than the second number. The first number is one less than twice the second number. The second number plus the third number equals ten. The sum of all five numbers is 30. What were the five numbers and in what order? Write a program to display the five numbers and their order.
4. Write a program to find  $i^{\text{th}}$  largest and  $j^{\text{th}}$  smallest element in the given array
5. Write a program to count the frequency of each element of an array.  
Example :  
Input the number of elements to be stored in the array :5  
Input 3 elements in the array :  
element - 0 : 25

element - 1 : 12

element - 2 : 43

element - 3 : 25

element - 4 : 43

Output :

The frequency of all elements of an array :

25 occurs 2 times

12 occurs 1 times

43 occurs 2 times

6. Write a program to replace every element in an array with the greatest element on its right side.

The given array is : 7 5 8 9 6 8 5 7 4 6

After replacement, the modified array is: 9 9 9 8 8 7 7 6 6 0

7. Write a program to count all distinct pairs for a specific difference in an array.

Example:

The given array is:

5 2 3 7 6 4 9 8

The distinct pairs for difference 5 are: [7, 2] [8, 3] [9, 4]

Number of distinct pairs for difference 5 are: 3

8. Given an array of integers. Find a peak element in it. An array element is peak if it is NOT smaller than its neighbors. For corner elements, we need to consider only one neighbor. For example, for input array {5, 10, 20, 15}, 20 is the only peak element. For input array {10, 20, 15, 2, 23, 90, 67}, there are two peak elements: 20 and 90. Write a program to print all the peak elements in a given array.

9. The ascending sequence of all reduced fractions between 0 and 1 that have denominators  $\leq n$  is called the "**Farey series of order n**". For example, the Farey series of order 7 is

$$\frac{0}{7} \quad \frac{1}{7} \quad \frac{1}{6} \quad \frac{1}{5} \quad \frac{1}{4} \quad \frac{2}{7} \quad \frac{1}{3} \quad \frac{2}{5} \quad \frac{3}{7} \quad \frac{1}{2} \quad \frac{4}{7} \quad \frac{3}{5} \quad \frac{2}{3} \quad \frac{5}{7} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{6}{7} \quad \frac{1}{1}$$

Write a program that prints the Farey series of order n.

10. The absolute distance between two integers  $x_1$  and  $x_2$  is given by  $|x_2 - x_1|$ . Write a program which sorts an array  $x[]$  of n integers in ascending order of their absolute distances with a given number z. For example, given  $x[] = \{9, 1, 12, 4, 2\}$  and  $z = 6$ , the sorted array will be  $x[] = \{4, 9, 2, 1, 12\}$ . Note that 4 is closest to 6, and 12 is farthest from 6, in terms of absolute distances.