Islamic University of Technology (IUT)

Organization of Islamic Cooperation (OIC)

Department of Electrical and Electronic Engineering (EEE)

Exercise - 01:

Problem statement: The following array contains the ODI ratings of 10 different countries.

Rating= [122,133,111,134,126,117,115,129,102,110]

Country = [“IND”, “AUS”, “SA”, “ENG”, “SRL”, “PAK”, “BD”,”ZIM”,”IRE”,”WI”]

Find the followings –

I. What is the maximum, minimum and average rating of the countries?
II. How many countries have ratings above the average rating?
III. Which country has a rating of 115?
IV. What is the rating of NZ?
V. Which 5 countries have the lowest rating?
VI. What is the difference in rating between “SA” and “IRE”?
VII. Remove “SRL” ‘s rating from the list.

*You can use for loop to answer some of the question. But it can also be done using vectorization. Give it a try.

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 02:

Problem statement: Summing Rows and Columns.

Given a matrix X, 1st add a column to the matrix whose elements are the summation of each rows. Then add a row to the matrix whose elements are the summation of all elements above in the same column.

Test case - 01:

- Input: X= [1,2,3;
  4 ,5,6;
  7,8,9]
- Output: y= [1, 2, 3, 7;
  4, 5, 6, 15;
  7, 8, 9, 24;
  12,15,18,45]

Test Case - 02:

- Input: x= [2,5;
  3,8]
- Output: y= [2,5,7;

  3,8,11;

  5,13,18]

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 03:

Problem statement: Min-Max

An array is provided. For example, a= [2,1,11,4,5,13]

Create an array from a like this way, out= [1,11,2,13,4,5]

- 1st take the smallest element from a and put it in output array.
- 2nd take the largest element from a and put it in output array.
- Then take the 2nd smallest element from a and put it in output array.
- Then take the 2nd largest element from a and put it in output array.

And so on.

* This is an interesting problem. There are many ways to do it. Can you come up with a way to do it by yourself? I believe you can. Give it a try.

Test Case-02:

- Input: a= [10,2,30,4,3,2,34,7,9]
- Output: [2,34,2,30,3,10,4,9,7]

**careful. The length of the array can be 100 or 1000. Your code should perform correctly for all cases.

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

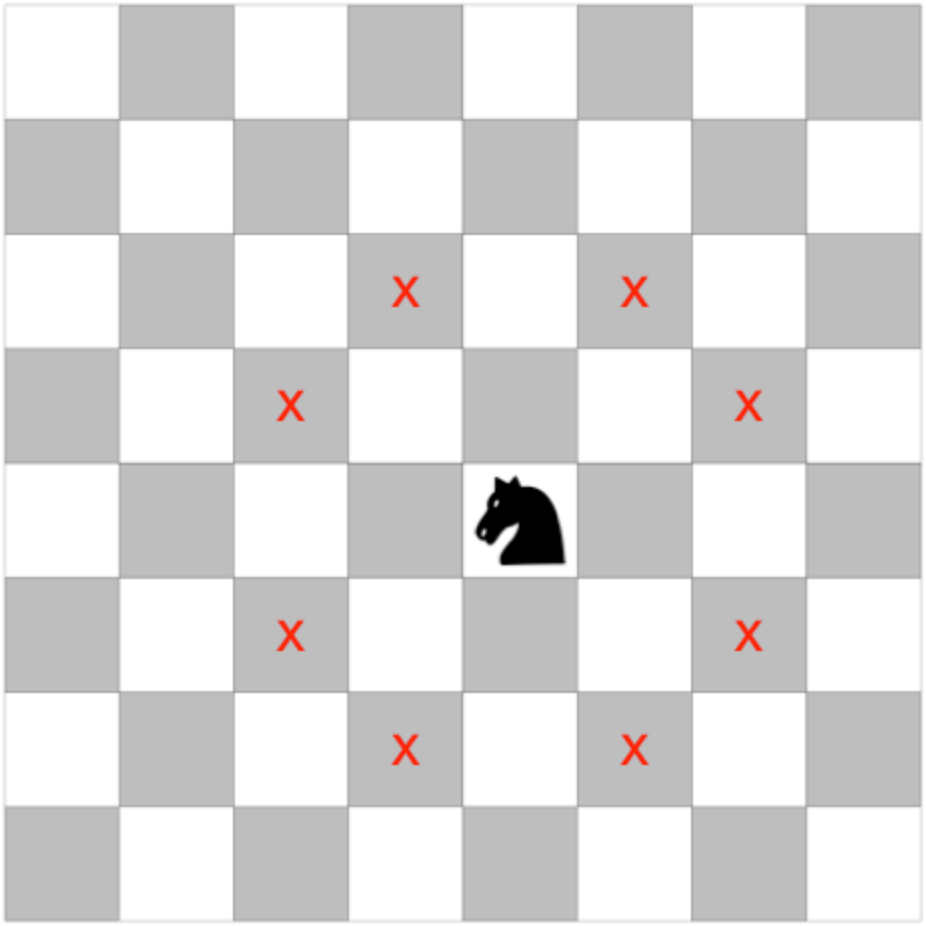
Exercise - 04:

Problem statement: One of my favorite games are chess. Let's do something with chess. If you don't know chess, that's completely fine. You can still solve this problem.

A chess board has 8 rows and 8 columns. You can think of it as an 8-by-8 matrix. Now your board contains only one piece, a knight. It is placed at (x,y) position. For the picture below, the knight is at (5,5).

A knight has 8 possible valid moves that are marked as cross in the picture. For example, a knight can move – 'two steps right and one step up' ; which brings it to position (4,7).

Write a code to find out those 8 valid positions from any value of (x,y).



Output: (4,7), (6,7), (4,3), (6,3), (3,4), (3,6), (7,4), (7,6). You can use a 8 by 2 matrix to represent.

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 05:

Problem statement: Given an array or a matrix or a string (character array), find the most frequent element. Plot histogram of the data.

Test case – 01:

- Input: a= [2,2,3,4,5,2,4,3,2,2,1,2,7,8,6]
- Output: 2

Test case – 02:

- Input: b= [2 4 4 2 7
  2 5 3 1 8
  3 2 2 2 6]
- Output: 2

Test case – 03:

- Input: a= ''ssdddfgt'
- Output: 'd'

Test case – 04:

- Input: a= 'you are not brave. Men are brave'
- Output: ' ' [space]

- Histogram plots the frequency of each element.

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 06:

Problem statement: Given an array, find alternating sum i.e. –

y = x (1) – x (2) + x (3) – x (4) + x (5) - …

Test Case – 01:

- Input: x = [2,5,4,6,1]
- Output: y = - 4

Test Case – 02:

- Input: x = repmat([1,0],1,20)
- Output: y = 20

Key Takeaway:

- repmat() is a built-in function. Check documentation to understand how it works.

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 07:

Problem statement: Given two strings, check whether they're anagram to each other or not.

Test Case – 01:

- Input: x = `"aaabbccd"`, y= `"abbccddd"`
- Output: False

Test Case – 02:

- Input: x = `"222233344441"`, y=`"122223334444"`
- Output: True

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 08:

Problem statement: 'Valid Sudoku'

In this problem, we'll perform a smaller version of sudoku checking.

Given a 3 by 3 matrix, check whether it is a valid sudoku or not. It'd be valid if –

I. Summation of all the elements in the matrix is 45.
II. The matrix contains only numbers 1 to 9.
III. There is no repetition of any number.

Test Case – 01:

- Input: x = [1,4,6; 2,3,9; 8,5,5]
- Output: False

Test Case – 02:

- Input: x = [1,4,6; 2,3,9; 8,7,5]
- Output: True

Test Case – 03:

- Input: x = [1,4,6; 2,0,9; 8,7,8]
- Output: False

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT

Exercise - 09:

Problem statement: Given a list of elements, extract the prime numbers from that array.

Test Case – 01:

- Input: a= [1,3,4,6,7,9,3,5,11,6432,636451,323423,5454,44363,223,55345,677,5343]
- Output: [3 7 3 5 11 223 677]

- You can try using 'isprime()' function. You are encouraged to try writing vectorized code.

Prepared by
ASIF NEWAZ
Lecturer, Department of EEE, IUT