EXPERIMENT 3: RELATIONAL OPERATORS, LOOPS & PLOTS

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Note: (1) *Write your answers only in the* ***Space provided*** *against* ***each question***

(2) *Use* ***HELP*** *option of Matlab*

Run #01: Relational Operators & Logical Operators & Control Loops

Q1. Write all **Relational** and **logical** Operators used in Matlab Programming

Ans. :

Relational:

Equality: ==

Greater than: >

Greater than or equal to: >=

Lesser than: <

Lesser than or equal to: <=

Inequality: ~

Array equality: *isequal*

Array equality (treating Nan values as equal): *isequaln*

Logical:

Logical operators with short-circuiting: short-circuit &&, ||

Logical AND: &

Logical OR: |

Logical NOT: ~

Logical XOR: xor

Determine if all elements of array is non zero or true: all

Logical 0: false

Find indices and values of non-zero elements: find

Determine if input is logical array: *islogical*

Convert numerical to logical values: *logical*

Logical 1: true

Q2. Check which of the following ***Variables*** are valid or invalid ? What are the reasons?

(a) log2 (b) under_dog(c) underdog (d) 5dog (e) log xyz

(f) abc-def (g) kota@55 (h) KINGmaker (i) Myclass21:42

Ans. :

(a) Invalid
(b) Valid
(c) Valid
(d) Invalid
(e) Invalid
(f) Invalid
(g) Invalid
(h) Valid
(i) Invalid

Q3. Write a matlab program to calculate the sum of the first 'n' terms of the series given below using for loop.

(Note : In the program, the **input** value 'n' should be taken from the user and **display** the output with the text message 'Total sum= ')

$$\sum_{k=1}^{n} \frac{(-1)^k k}{2^k}$$

Example : variable controlled loop	***Example : Relational controlled loop***

`for variable = initial:inc:final`
`statements`
end
 	
% inc = increment
	`while relation`
	`statements`
	end

Example : An **if-elseif-else** structure in MATLAB

if expression1 % is true
% execute these commands
elseif expression2 % is true
% execute these commands
else % the default
% execute these commands
End

Ans. :

```
n = input("enter a number");
summ = 0;
for i = 1:1:n;
    summ = summ + (((-1)^i)*i)/(2^i);
```

```
end
disp("Total value = ")
disp(summ);
```

Output:

enter a number5

Total value =

-0.2813

Q4. The following were the daily maximum temperatures (in F) for one month

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
T(F)	58	73	73	53	50	48	56	73	73	66	69	63	74	82	84
Day	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
T(F)	91	93	89	91	80	59	69	56	64	63	66	64	74	63	69

Write a Matlab program using relational & logical operators and control loops to determine the following:

The number of days the temperature was

(i) above 75 (ii) between 60 and 80 (iii) between 50 and 60

Ans. :

```
T = [58, 73, 73, 53, 50, 48, 56, 73, 73, 66, 69, 63, 74, 82, 84, 91, 93, 89,
91, 80, 59, 69, 56, 64, 63, 66, 64, 74, 63, 79];

count1 = 0;
count2 = 0;
count3 = 0;

for day = 1:1:30
    if T(day)>75
        count1 = count1 + 1;
    end
```

```
    if T(day)>=60 && T(day)<=80
        count2 = count2 + 1;
    end
    if T(day)>=50 && T(day)<=60
        count3 = count3 + 1;
    end
end

disp("Number of days >75: ")
disp(count1)
disp("Number of days >=60 and <=80: ")
disp(count2)
disp("Number of days >=50 and <=60: ")
disp(count3)
```

Output:

Number of days >75:

8

Number of days >=60 and <=80:

17

Number of days >=50 and <=60:

6

Q5. Write a MATLAB program to generate two random matrices, A and B of order m×n and p×q. Check whether the condition required for matrix multiplication is satisfied or not using relational operators.. If satisfied perform matrix multiplication else display matrix multiplication is not possible using **disp** keyword. Write a generic program which takes the order of the matrices during run from the user (use **input** keyword).

Ans. :

```
A = input("Enter the dimensions of first matrix ");
B = input("Enter the dimensions of the second matrix ");

if A(2)==B(1)
    disp(randn(A(1),A(2))*randn(B(1),B(2)))
else
    disp("The matrix multplication is not possible");
```

```
end
```

Output:

Enter the dimensions of first matrix [2 3]

Enter the dimensions of the second matrix [2 3]

The matrix multplication is not possible

Output2:

Enter the dimensions of first matrix [2 4]

Enter the dimensions of the second matrix [4 3]

```
  -0.4201    5.7183    0.6631
   3.7980   -2.1843    4.5105
```

Run #02: PLOTS

Q6. Keywords for plotting a figure

Q12. Write comments (i.e. what is the purpose/what is its functionality) on the following keywords related to plotting a figure in MATLAB

(i) plot ( );
(ii) stem ( );
(iii) Subplot ( );
(iv) x-label ( );
(v) y-label ( );
(vi) title ( );
(vii) legend ( );
(viii) figure ( );
(ix) grid ( );
(x) axis ( );
(xi) hold on;
(xii) hold off;

Answer :

Done in the previous experiment

Q7. Write a matlab program using editor window to plot the function y = cos(t). Define a time vector 't' from 0 to 10 sec with an increments/steps of 0.1. Use x-label, y-label, title commands to name the x-axis, y-axis and figure title.

Answer : Done in the previous experiment

Q8. .Write a MATLAB program to define a time vector 't' from 0 to 2π with an increment/steps of $\pi/100$. Using the generated 't' values calculate the signals X1, X2 and X3 as given below

$$X_1(t) = \sin(t) \quad ; \qquad X_2(t) = \sin(t - 0.25) \quad ; \qquad X_3(t) = \sin(t - 0.5)$$

Plot $X_1(t)$, $X_2(t)$, $X_3(t)$ on same figure window (1) using hold on. Use different the plotting features like (a) linewidth (b) color and (c) different markers. (2) Without using 'hold on' now divide the figure window into subplots and plot X1, X2 and X3 in three separate subplots.

Answer : Done in the previous experiment

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Link for uploading the completed observation is given separately for Tuesday and Thursday Batches

Thursday Batch Due on Sunday Feb 14th 5 PM

link to upload your observations **https://forms.gle/ikMbAtri9i3mYnTs7**

Tuesday Batch Due on Sunday Feb 21st 5 PM

link to upload your observations https://forms.gle/Kh5p2ruvo2AT6cm89