University of Tabuk
Faculty of Computers and Information Technology
Department of Computer Science
Second Semester 1442
CSC-606 Computer Vision/ Master of Science- Artificial Intelligence
Lab Assignment #1
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LAB 1 - The fundamentals of Matlab programming

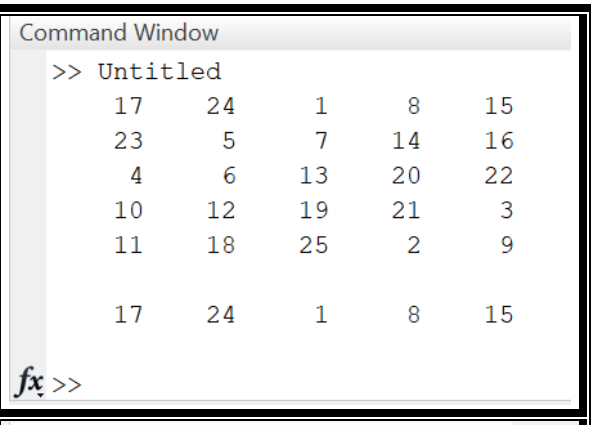
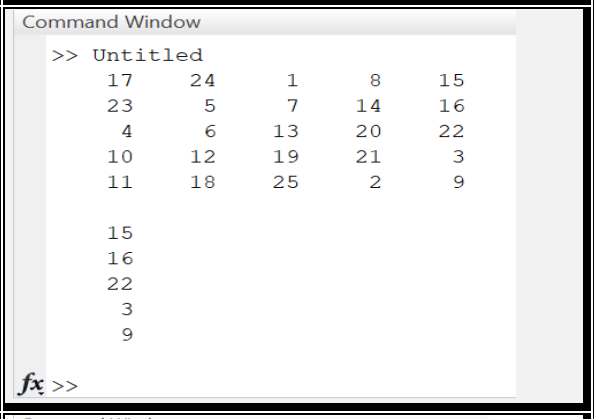
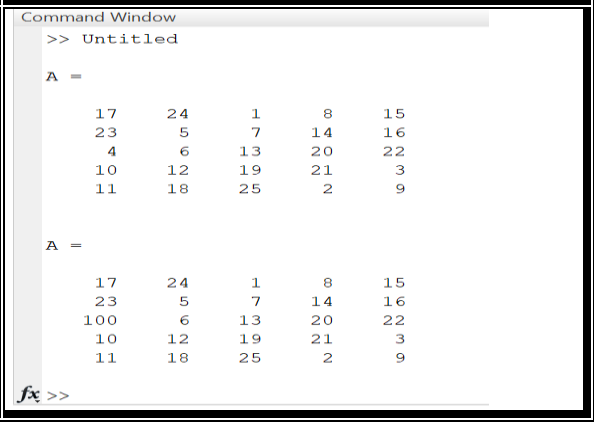
The purpose of this project is to study **the fundamentals of Matlab programming**.

2.1. Basic Matrix operations

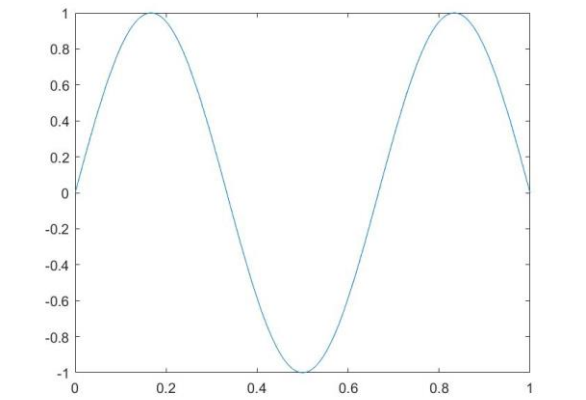
Using Matlab, perform the following:

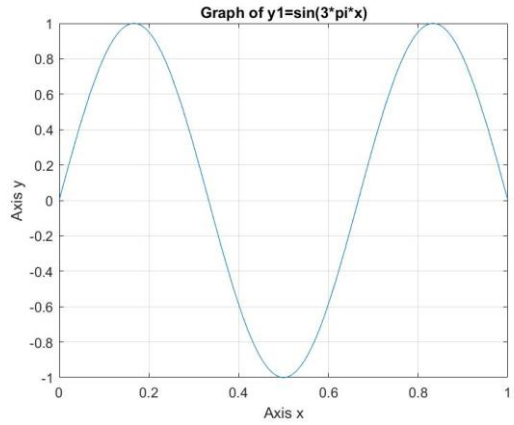
Questions	code	output
1. **Use the function "magic" to create a matrix A, where the number of rows and the number of columns are five.**	**A = magic(5);** **disp(A)**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 fx >>
2. **Find the elements along the diagonal of the matrix A.**	**A = magic(5);** **disp(A)** **D = diag(A);** **disp(D)**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 17 5 13 21 9 fx >>
3. **Determine the maximum values for each column of the matrix A.**	**A = magic(5);** **disp(A)** **max_A = max(A);** **disp(max_A)**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 23 24 25 21 22 fx >>

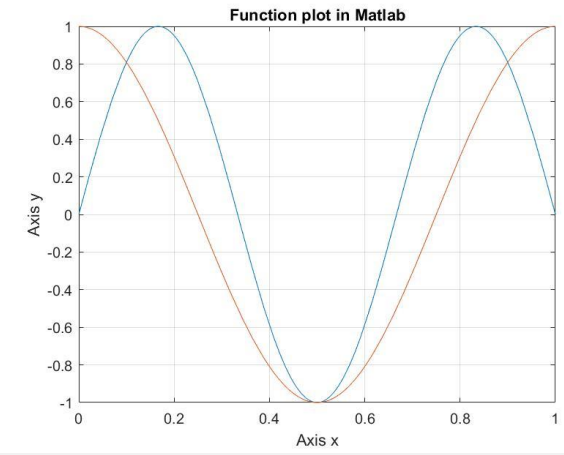
4. **Determine the minimum values for each column of the matrix A.**	**A = magic(5);** **disp(A)** **min_A = min(A);** **disp(min_A)**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 4 5 1 2 3 fx >>
5. **Find the average of each column.**	**A = magic(5);** **disp(A)** **mean_A = mean(A);** **disp(mean_A)**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 13 13 13 13 13 fx >>
6. **Determine the average of all numbers in the matrix A.**	**A = magic(5);** **disp(A)** **mean_all = mean2(A);** **disp(mean_all)**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 13 fx >>
7. **Use the desired notation to access the element in the first row and the forth column of the matrix A.**	**A = magic(5);** **disp(A)** **disp(A(1,4))**	Command Window >> Untitled 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 8 fx >>

8. **Use the favorite notation to access the first row of the matrix A.**	**A = magic(5);** **disp(A)** **disp(A(1:1,:))**	
9. **Use the favorite notation to access the last column of the matrix A.**	**A = magic(5);** **disp(A)** **disp(A(:,end:end))**	
10. **Change the third element of the matrix A by the value 100.**	**A = magic(5)** **A(3)=100**	

2.2.Graphics

Questions	code	output
1. Plot the function y1 = sin (3*pi*x), where 0 <x <1.	y1 = @(x) sin(3*pi*x); fplot(y1,[0 1])	

2. Added the labels, the title and the grid of this figure.	y1 = @(x) sin(3*pi*x);
	fplot(y1,[0 1])
	title('Graph of y1=sin(3*pi*x)')
	grid on
	xlabel('Axis x');
	ylabel('Axis y');
		

3. On the same graph, Plot the function y2 = cos (2*pi*x), where 0 <x <1.	y1 = @(x) sin(3*pi*x);
	fplot(y1,[0 1])
	title('Function plot in Matlab')
	grid on
	xlabel('Axis x');
	ylabel('Axis y');
	hold on
	y2 = @(x) cos(2*pi*x);
	fplot(y2,[0 1])
		

2.3.Function

Questions	code	output
1. **Write a function that determines the minimum value and the maximum value of a matrix A.**	**function [minx,maxx] = min_max(x)** **minx = min(min(x));** **maxx = max(max(x));** **end**	Command Window >> x=magic(5) x = 17 24 1 8 15 23 5 7 14 16 4 6 13 20 22 10 12 19 21 3 11 18 25 2 9 >> [minx,maxx] = min_max(x) minx = 1 maxx = 25 fx >>
2. **Write a function that calculates the area of a circle.**	**function [area] = circle_area(radius)** **area = pi*radius^2;** **end**	Command Window >> circle_area(10) ans = 314.1593 fx >>

Discussion of results

About 2.1

```
1 -    A = magic(5);
2 -    disp(A)
3 -    D = diag(A);
4 -    disp(D)
5 -    max_A = max(A);
6 -    disp(max_A)
7 -    min_A = min(A);
8 -    disp(min_A)
9 -    mean_A = mean(A);
10 -   disp(mean_A)
11 -   mean_all = mean2(A);
12 -   disp(mean_all)
13 -   disp(A(1,4))
14 -   disp(A(1:1,:))
15 -   disp(A(:,end:end))
16 -   A(3) = 100;
17 -   y1 = @(x) sin(3*pi*x);
18 -   fplot(y1,[0 1])
19 -   title('Function plot in Matlab')
20 -   grid on
21 -   xlabel('x');
22 -   ylabel('y');
23 -   hold on
24 -   y2 = @(x) cos(2*pi*x);
25 -   fplot(y2,[0 1])
26 -   f1 = min_max(A);
27 -   r=20;
28 -   area = circle_area(r)
```

***The first line of code creates a matrix with the dimensions of 5x5**
***On the second line, the matrix is displayed.**
***On line 3 and 4 we display the diagonal of the matrix. It is returned in the form of a vector**
***On line 5 and 6, we display the max of each single value of column of the matrix**
***On line 7 and 8 we use almost the same principle, but this time we display the minimum.**
***Mean on line 9 and 10 displays the mean of each column while mean2 on line 11 and 12 displays the average of the whole matrix.**
***On line 13 We are asked to retrieve the element that is located in the first row and fourth column so we simply use the matrix name along with bracelets and the index of the wanted element.**
***On line 14 we display the first row**
***On line 15 we display the last column**
***The difference between the two lines is the keyword "end" which can retrieve the last element of the matrix without actually knowing the number of elements in it.**
***We simply use the matrix name and one parameter to access and change the value of the 3rd Element in the matrix.**
***Before plotting the function, we store it in a variable then we just plot it using the function fplot**
***In line 19, 20, 21, 22 we use all the parameters in order to add grid, change title and use hold on in order two plot two functions in the same place.**

About 2.2

```
y1 = @(x) sin(3*pi*x);
fplot(y1,[0 1])
title('Function plot in Matlab')
grid on
xlabel('Axis x');
ylabel('Axis y');
hold on
y2 = @(x) cos(2*pi*x);
fplot(y2,[0 1])
```

***On the first and second line, we Plot the function y1.**
***On the 3 we put title to the plot.**
***On the 4 we use the grid.**
***On line 5 and 6 we put name to Axis x and Axis y.**
***On line 7 we use hold on to add another figure.**
***On line 8 and 9 we plot the function y2.**

About 2.3

```
function [minx,maxx] = min_max(x)
    minx = min(min(x));
    maxx = max(max(x));
end
```

```
function [area] = circle_area(radius)
area = pi*radius^2;
end
```

We write here two function of min, max of matrix and another function to calculate the circle of area.