

SHEET (2)

1-What are you expecting to see in the command window after running the following scripts? Also, Comment on your answer .

a- <code>clc; clear;</code> <code>x=[3 1;4 5];</code> <code>y=[4 3];</code> <code>z=x*y'</code>	b- <code>clc; clear;</code> <code>x=[3 1;4 5];</code> <code>y=[4 3];</code> <code>z=y*x</code>	c- <code>clc; clear;</code> <code>x=[3 1;4 5];</code> <code>y=[4 3];</code> <code>z=y/x</code>
d- <code>clc;</code> <code>clear x y</code> <code>x(3,3)=3;</code> <code>x=[1 4;5 -3]</code> <code>Z=x';</code>	e- <code>clc;</code> <code>clear x y</code> <code>x=[1 4;5 -3]</code> <code>x(3,3)=3;</code> <code>z=x(3,2)</code> <code>y=x(:,3)</code>	f- <code>clc;</code> <code>clear x y</code> <code>x=[1 4;5 -3]</code> <code>x(3,3)=1;</code> <code>y=x(1,2:3)</code> <code>z=(x,[13] y)</code>

2- Using the zeros, eye, and ones built-in matrices in MATLAB, create the 4 arrays (D,E,F,G), where

- D should be $M \times N$ filled with ones,
 - E should be $M \times M$ filled with three's,
 - F should be $N \times N$ with five's on the diagonal, and
 - G should be $N \times M$ filled with 0's.
- (M varies between 3 and 6 and N varies between 4 and 7).

3- Create the following matrix by using vector notation for creating vectors with constant spacing and/or the linspace command. Do not type individual elements explicitly

$$A = \begin{bmatrix} 130 & 110 & 90 & 70 & 50 & 30 & 10 \\ 1 & 2.8333 & 4.6667 & 6.5 & 8.3333 & 10.1667 & 12 \\ 12 & 22 & 32 & 42 & 52 & 62 & 72 \end{bmatrix}$$

4-Create the following matrix by typing one command. Do not type individual elements explicitly

$$F = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 10 & 20 \\ 0 & 0 & 2 & 8 & 26 \\ 0 & 0 & 3 & 6 & 32 \end{bmatrix}$$

5- Given the matrix

$$A = \begin{bmatrix} 3 & 7 & -4 & 12 \\ -5 & 9 & 10 & 2 \\ 6 & 13 & 8 & 11 \\ 15 & 5 & 4 & 1 \end{bmatrix}$$

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- Sort each column and store the result in an array B.
- Sort each row and store the result in an array C.
- Add each column and store the result in an array D.
- Add each row and store the result in an array E.
- Find the maximum and minimum values in each column and row.
- Use element-by-element to divide and multiply the first row of A by the first three elements of the third column of B. Evaluate the sum of the elements of the resulting vector.

6- The following table shows the hourly wages, hours worked, and output (number of widgets produced) in one week for five widget makers.

	Worker				
	1	2	3	4	5
Hourly wage (\$)	5	5.50	6.50	6	6.25
Hours worked	40	43	37	50	45
Output (widgets)	1000	1100	1000	1200	1100

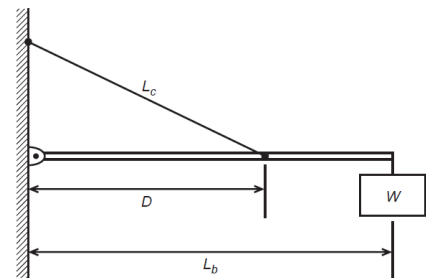
Use MATLAB to answer these questions:

- How much did each worker earn in the week?
- What is the total salary amount paid out?
- How many widgets were made?
- What is the average cost to produce one widget?
- How many hours does it take to produce one widget on average?
- Assuming that the output of each worker has the same quality, which worker is the most efficient? Which is the least efficient?

7- A cable of length L_c supports a beam of length L_b , so that it is horizontal when the weight W is attached at the beam end. The principles of statics can be used to show that the tension force T in the cable is given by

$$T = \frac{L_b L_c W}{D \sqrt{L_b^2 - D^2}}$$

Where: D is the distance of the cable attachment point to the beam pivot, see Fig. 1.



- For the case where $W = 400$ N, $L_b = 3$ m, and $L_c = 5$ m, use element-by element operations and the min function to compute the value of D that minimizes the tension T . Compute the minimum tension value.
- Check the sensitivity of the solution by plotting T versus D . How much can D vary from its optimal value before the tension T increases 10 percent above its minimum value?

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8- Solve the following equations using MATLAB.

$$4.5x_1 + 6.8x_2 + 6x_3 + 2x_4 = 5$$

$$2x_1 + 3x_2 + 9.1x_3 + 10x_4 = 5$$

$$x_2 + 4x_3 + 5.1x_4 + x_1 - 5.9 = 0$$

$$3x_1 + x_2 + x_3 + 5x_4 = 7.5$$

9-Find the roots and derivative of the following equations

a. $y^3 + 32y^2 + y = 127$

b. $3d^4 + 2d^3 + d^2 = 65$