COMPUTER APPLICATIONS

Mathematical Operations with Array

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ADDITION AND SUBTRACTION

- The operations + (addition) and (subtraction) can be used to add and subtract arrays of identical size.
- They can also be used to add and subtract a scalar to an array.
- The matrix dimension MUST AGREE in addition and subtraction.

$$A = \begin{bmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \end{bmatrix} \text{ and } B = \begin{bmatrix} B_{11} & B_{12} & B_{13} \\ B_{21} & B_{22} & B_{23} \end{bmatrix} \begin{bmatrix} (A_{11} + B_{11}) & (A_{12} + B_{12}) & (A_{13} + B_{13}) \\ (A_{21} + B_{21}) & (A_{22} + B_{22}) & (A_{23} + B_{23}) \end{bmatrix}$$

EXAMPL

>> A = [3 4 4; 2 6 3]; B = [2 - 1 -8; -1 0 12];

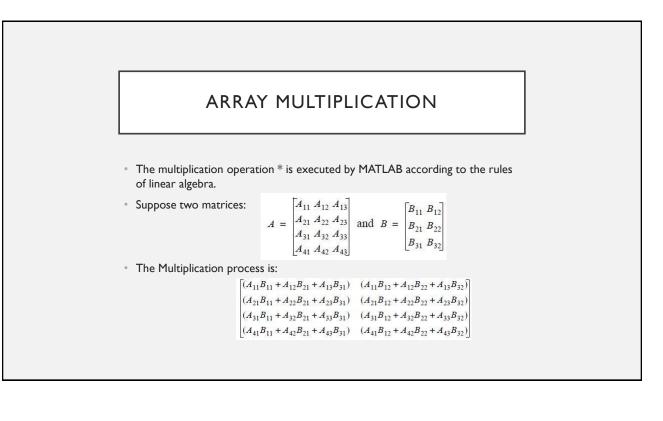
5 3 -4

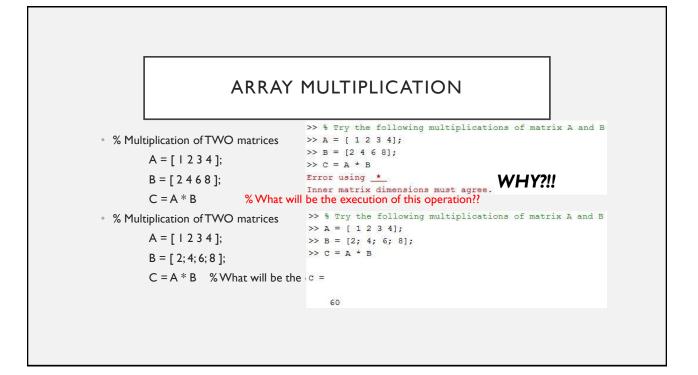
1 6 15

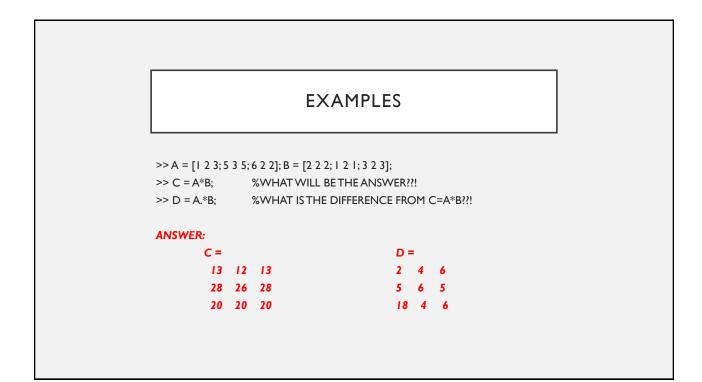
>> C = A + B C= >> A = [3 4 4; 2 6 3]; B = [2 - 1 -8; -1 0 12];

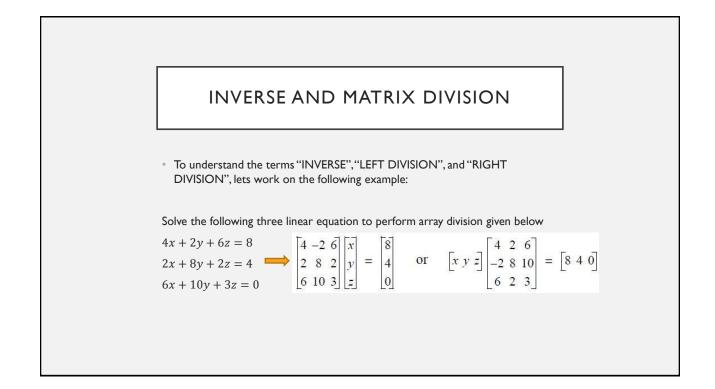
>> D = A – B D =

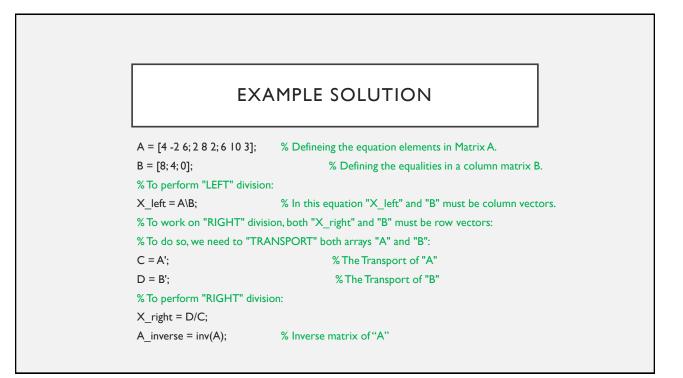
I 5 I2 3 6 -9

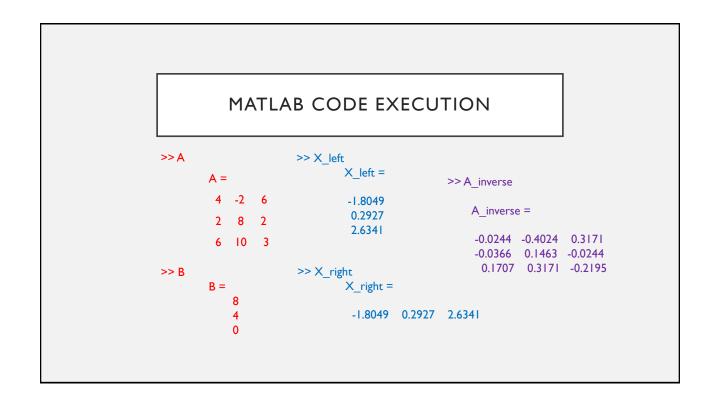


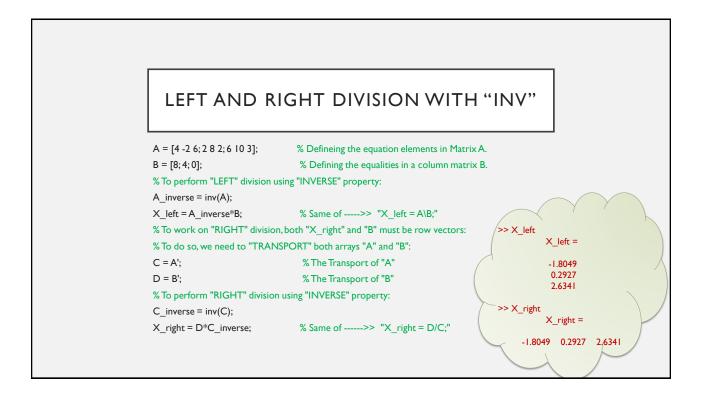












	SOME BUILT	IN FUNCTIONS
A = [13 22	. 76 44 90 12 16 13];	% A one-dimensional array
mean(A)		% Find the average value of vector A
	ans = 35.7000	
max(A);		% Find the largest elements among all elements in vector A
	ans = 90	
min(A);		% Find the smallest elements among all elements in vector A
(•)	ans = 12	% Adds all elements of vector A
sum(A);	ans = 286	% Adds all elements of vector A
sort(A);	diis - 200	% Ascending arrangement
301 t(A),	ans = 12 13 13 16 22 44	
median(A);		% Median value of vector A
	ans = 19	
std(A);		% Standard deviation of vector A
	ans = 31,1895	

BUILD	-IN FUNCTION WITH MATRIX
A = [1 2 3; 4 5 6];	
B = [3 4 2; 5 3 5];	
mean(A)	
	ans = 2.5000 3.5000 4.5000
median(A)	
	ans = 2.5000 3.5000 4.5000
sum(A)	- 5 - 7 - 0
sort(A)	ans = 5 7 9
301 ((A)	ans =
	I 2 3
	4 5 6

THE "rand"	COMMAND
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Command	Description	Example							
rand	Generates a single random number between 0 and 1.	>> rand ans = 0.2311							
rand(1,n)	Generates an n-element row vector of random numbers between 0 and 1.	>> a=rand(1,4) a = 0.6068 0.4860 0.8913 0.7621							
rand(n)	Generates an $n \times n$ matrix with random numbers between 0 and 1.	<pre>>> b=rand(3) b = 0.44565 0.4447 0.9218 0.0185 0.6154 0.7382 0.8214 0.7919 0.1763</pre>							
rand(m,n)	Generates an $m \times n$ matrix with random numbers between 0 and 1.	<pre>>> c=rand(2,4) c = 0.4057 0.9169 0.8936 0.3529 0.9355 0.4103 0.0579 0.8132</pre>							
randperm(n)	Generates a row vector with n elements that are random permutation of integers 1 through n.	>> randperm(8) ans = 8 2 7 4 3 6 5 1							

т	HE "randi" CC	MMA		C	
Command	Description	Example	e		
randi (imax) Generates a single random number between 1 and imax. 9			5)		
randi(imax, n)	Generates an $n \times n$ matrix with random integers between 1 and imax.	>> b=ra b = 4 14 1	ndi (15 8 3 15	1:	
randi(imax, m,n)	Generates an $m \times n$ matrix with random integers between 1 and imax.	>> c=ran c = 1 11	di (15,: 1 2	8	13

HOME WORK I

• Generate a random matrix of dimensions of (5x7) with elements confined between 20 and 60 and then find the following:

 \Box The inverse of the matrix,

 \Box The largest and the smallest elements in row 3,

Evaluate the following expression:

$$A = \cos(x) + x^2 \sqrt[5]{x}$$

HOME WORK II

Define *p* and *w* as scalars, p = 2.3 and define w = 5.67, and, *t*, *x*, and *y* as the vectors t = [1, 2, 3, 4, 5], x = [2.8, 2.5, 2.2, 1.9, 1.6], and y = [4, 7, 10, 13, 17]. Then use these variables to calculate the following expressions using element-by-element calculations for the vectors.

(a)
$$T = \frac{p(x+y)^2}{y} w$$
 (b) $S = \frac{p(x+y)^2}{yw} + \frac{wxt}{py}$