Week 2

Write single line command in MATLAB to create the following matrices

1	0	0	1	2	3	4	5	6
0	1	0	0	0	0	1	0	0
0	0	1	0	0	0	0	1	0
0	0	0	0	0	0	0	0	1
1	1	1	1	1	1	1	1	1

1.7	1.6	1.5	1.4	1.3	1.2
22	24	26	28	30	32
9	8	7	6	5	4
5	5	5	0	0	0

2a. Suppose the matrix created in 1(ii) is H. Now, create a 2X4 matrix G such that its first row includes the first two elements and the last two elements of the first row of H, and the second row of G includes the second through the fifth elements of the third row of H.

H(1, end-1:end); H(2,2:5)]

3. Create two row vectors;

A=[-4 10 0.5 1.8 -2.3 7] B=[0.7 9 -5 3 -0.6 12]

a. Use the two vectors in a MATLAB command to create a 2X4 matrix such that the first row consists of element 2 through 5 of vector A, and the second row consists of elements 3 through 6 of vector B

1.8 -2.3

4. Create a 5X3 matrix C holding the information of 5 vehicles. The first column will hold the traversed distance by them in 5 hours. These values will be provided by the user in terms of one 1X5 array, named s. Second column will hold their final velocities (assume that their initial velocities were 0). Now the third column of C holds their acceleration (consider that they have uniform acceleration through 5 hours).

Show the matrix and find the vehicle index with highest velocity. Find their mean and median acceleration

Week 3

1> Use matrix operation to solve the following system of linear equations

$$4x - 2y + 6z = 8$$
$$2x + 8y + 2z = 4$$
$$6x + 10y + 3z = 0$$

2. Define the vector $v = [10\ 9\ 8\ \ldots\ 1]$. Then use the vector in a mathematical expression to create following vectors:

a> $a = [10^2\ 9^2\ 8^2\ \ldots\ 1^2]$

b> $b = [9\ 8\ 7\ 6\ \ldots\ 0]$

3> Use matlab to show that the sum of the infinite series

$$\sum_{n=1}^{\infty} \frac{1}{2^n} = \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \ldots$$

converges to 1. Do it by computing the sum for

a> n=10 b> n=20 c> n=30 d> n=40

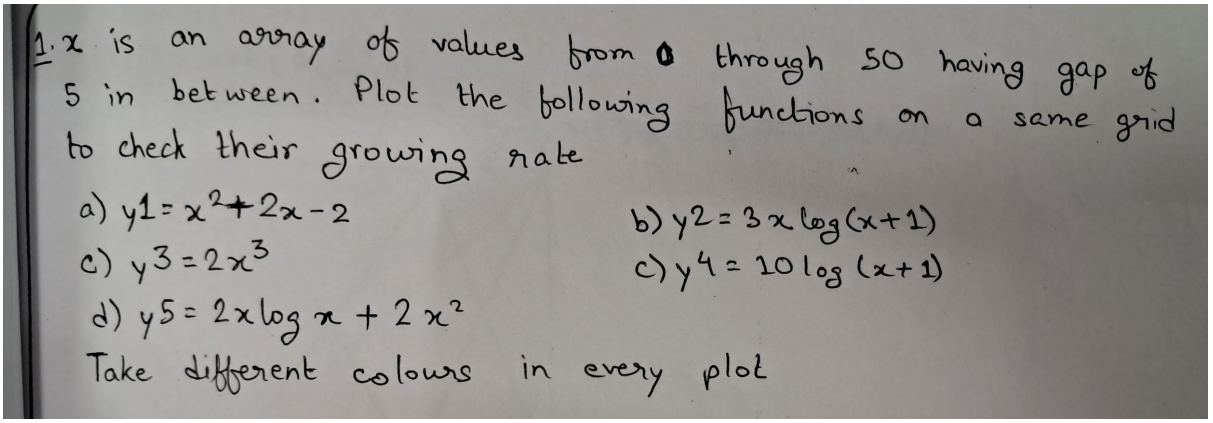
4> Take three matrices A,B,C of dimensions 3X3. Then check the following:

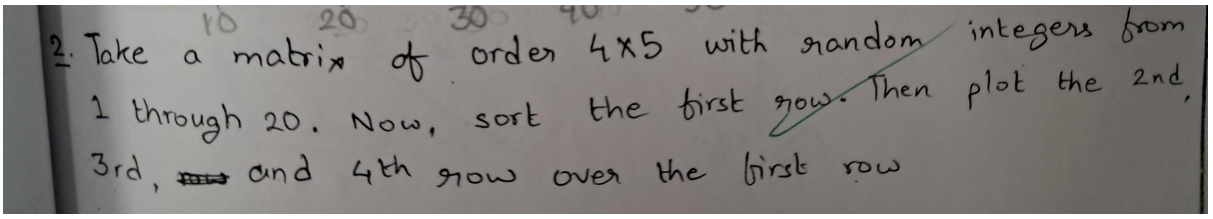
i> (A+B)*C = ? A+(B*C)

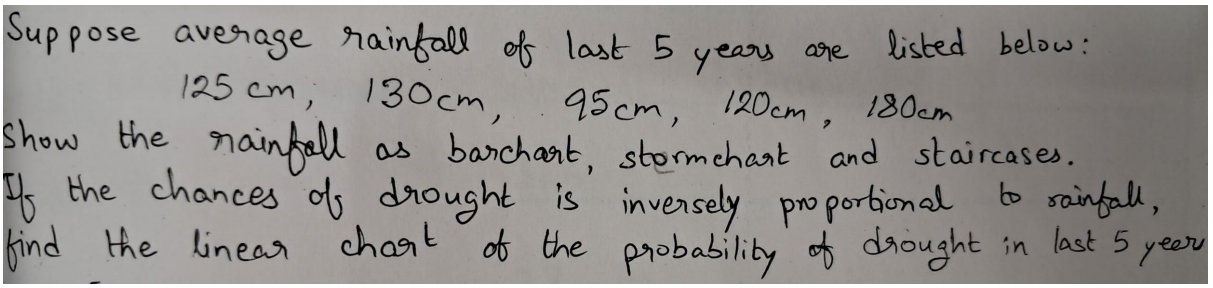
ii> A*B*C = ? C*B*A

iii> (A*B)*C = ? A*(B*C)

Week 4







Week 10

1) Write a user-defined function that calculates grade point average (GPA) on a scale of 0 to 4, where A=4, B=3, C=3, D= I, and E= 0. For the function name and arguments use av = GPA (g, h). The input argument g is a vector whose elements are letter grades A, B, C, D, or E entered as strings. The input argument h is a vector with the corresponding credit hours. The output argument av is the calculated GPA. Use the function to calculate the GPA for a student with the following record:

Grade	B	A	C	E	A	B	D	B
Credit Hours	3	4	3	4	3	4	3	2

For this case the input arguments are:
g=['BACEABDB'] and h=[3 4 3 4 3 4 3 2].

2) Write a user-defined MATLAB function that determines the unit vector in the direction of the line that connects two points (A and B) in space. For the function name and arguments use n = unitvec (A,B). The input to the function are two vectors A and B, each with the Cartesian coordinates of the corresponding point. The output is a vector with the components of the unit vector in the direction from A to B. If points A and B have two coordinates each (they are in the x y plane), then n is a two-element vector. If points A and B have three coordinate each (general points in spacc), then n is a three-element vector. Use the function to determine the following unit vectors:
(a) In the direction from point (1.2, 3.5) to point (12, 15).
(b) In the direction from point (-10, -4, 2.5) to point (-13, 6, -5).

Week 9

1) Find the roots of a quadratic equation $ax^2+bx+c=0$
2) Write a function to find the n^{th} Fibonacci number
3) Write a function for finding whether a number is a perfect number

Week 8

Q1. use for loop in a script file to calculate the sum of first n terms of the series $\sum_{k=1}^{n} \frac{(-1)^k \cdot k}{2^k}$ for $n=4$ and $n=20$.

Q2. $v = [5, 17, -3, 8, 0, -7, 12, 15, 20, -6, 6, 4, -7, 16]$
Write a program that doubles the elements that are positive and divisible by 3 or 5 and raises to the power of 3, the elements that are negative ~~en~~ but greater than -5.

Q3. Create a $n \times m$ matrix. i) value of each element in the first row is the number of columns, ii) In the first column, is the number of rows. The other elements, will have the sum of the elements just above it and just left to it.

Q: write a program using switch cases
a) find whether number is prime.
b) check whether a number is armstrong number
c) find the factorial of a given number using iteration

Week 7

1). $x = \sqrt{t}\sin(2t)$, $y = \sqrt{t}\cos(2t)$, $z = 0.5t$
plot the points for $0 \leq t \leq 6\pi$.

Draw a meshgrid for $-1 \leq x \leq 3$, $1 \leq y \leq 4$.

```
= (-1 : 0.1 : 3);
= (1 : 0.1 : 4);
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3) Suppose $z = \frac{xy^2}{x^2+y^2}$ over the domain $-1 \leq x \leq 3$ and $1 \leq y \leq 4$. Draw the surface.

4) Make a 3D mesh plot of the function $Z = \frac{\sin R}{R}$, $R = \sqrt{x^2+y^2}$ in the domain $-10 \leq x \leq 10$, $-10 \leq y \leq 10$

5) Make a 3D surface plot of function $Z = \frac{x^2}{3} + 2\sin(3y)$ in the domain $-3 \leq x \leq 3$, $-3 \leq y \leq 3$

Week 6

Position of an object $x(t) = 0.2t^4 - 6.8t^3 + 50t^2 - 7.2t^2 + 9.4$, find $v(t)$ and $a(t)$ and plots of position, velocity and acceleration for $0 \leq t \leq 8$. First plot all three plots as in the same graph with grid. Then plot them as subplots.

t = (0:1:8);

Taylor series for $\sin(x)$ is $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

Plot the figure for $-2\pi \leq x \leq 2\pi$ for $\sin(x)$ directly. Then plot the Taylor series expansion for $\sin(x)$ for one, two and five terms. Label the axes.

Week 5

Assume $y1 = \sin(t)$, $y2 = \cos(t)$, $y3 = \text{cosec}(t)$, $y4 = \sec(t)$, $y5 = t^2$, $y6 = t^3$. Draw all these plots as 3 subplots, where each row will contain 2 plots. Give different colours to them. 't' is represented in degree. $0° \leq t \leq 360°$. Take the difference b/w 2 consecutive t value as 0.001

2. The following data points are the daily maximum temperature in a city during the month.

58, 73, 73, 53, 50, 48, 56, 78, 73, 66, 69, 74, 82, 84, 91, 93, 89, 91, 80, 59, 69, 56, 64, 63, 66, 63, 50.

a) Draw the histogram of the dataset.