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CALCULUS (LAB)

①

1) NATLAB

- * `clc` \rightarrow clear the screen
- * If you use ";" it will suppress the output
- * "%" is used to convert the line into comment

Precedence:

exponent $>$ multiply, division $>$ addition, subtraction.

left to right

if brackets are there then brackets will be executed first.

Sum: $\frac{1}{2+3^2} + \frac{4}{5} \times \frac{6}{7} = 0.7766$

- * Default no of decimal is 4 places. (format short)
- * to increase the no of dec. places use format long.
- * `exp(x)` $\Rightarrow e^x$
- * `sqrt(x)` $\Rightarrow \sqrt{x}$
- * `log(x)` $\Rightarrow \log_e x$
- * `log10(x)` $\Rightarrow \log_{10} x$
- * `pi` $\Rightarrow 3.1416$
- * `inf` $\Rightarrow \infty$
- * `abs(x)` \Rightarrow absolute value
- * `sign(x)` \Rightarrow gives +1 if +ve, -1 if -ve, 0 if 0
- * `ceil(1.333)` $= 2$
- * `floor(1.333)` $= 1$

$$a=9; x=2; y=8$$

Sol: $y = e^{-a} * \sin(x) + 10 * x \sqrt{y} = 28.29024$

Row matrix

$$b = [1, 2, 3, 4]$$

$$b = [1; 2; 3; 4] \Rightarrow \text{column}$$

convert row \Rightarrow column use (dash)

$$b(1) = 1$$

$$b(3) = 3$$

$$b(1:3) = 1 \ 2 \ 3$$

$$b(:) = 1 \ 2 \ 3 \ 4$$

$$a = [1 \ 2 \ 3; 4 \ 5 \ 6; 7 \ 8 \ 9]$$

$$a = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$4 \ 5 \ 6$$

$$7 \ 8 \ 9$$

$\det(a) \Rightarrow$ determinant

$\text{inv}(a) \Rightarrow$ inverse

$a' \Rightarrow$ transpose

$\text{size}(a) \Rightarrow$ rows, columns.

$$a(1,3) = 3$$

$$a(2,:) = 4 \ 5 \ 6$$

$$a(:,3) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$$

(continued in pg - 6)

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(calculus lab-1 (continuation))

$\text{diag}(A) \Rightarrow$ diagonal element

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\text{diag}(A) = 1 \ 5 \ 9$$

$\text{eye}(2,3) \Rightarrow$ gives identity matrix of order 2×3 .

$\text{zeros}(2,3) \Rightarrow$ gives matrix full of zeros

$\text{ones}(3) \Rightarrow$ gives matrix full of ones.

$\text{rand}(2,3) \Rightarrow$ gives a matrix of random elements.

$$B = [10 \ 20 \ 30; 40 \ 50 \ 60; 70 \ 80 \ 90]$$

$A+B \Rightarrow$ addition of matrix

$A-B \Rightarrow$ subtraction of matrix

$A*B \Rightarrow$ multiplication of matrix

$A.*B \Rightarrow$ multiplication element wise (dot product)

$X = \text{inv}(A) * B$ for solution.

$A^2 \Rightarrow$ Square of the matrix

$A.^2 \Rightarrow$ Square of individual elements

LAB-2

Plotting of sin

$\text{plot}(x,y) \Rightarrow$ plots the graph.

$$x = 0 : \pi/100 : 2 * \pi$$

start

↓

increment/
step value

↓
stop

~~plot~~

$$x = 0 : \pi/100 : 2\pi$$

$$y = \sin(x)$$

plot(x, y) \Rightarrow third argument where $[\text{plot}(x, y, 'r')]$ $\xrightarrow{\text{set graph}}$

xlabel(' ') \Rightarrow labeling x axis

ylabel(' ') \Rightarrow labeling y axis.

title(' ') \Rightarrow title of the graph.

linspace(start, stop, number of values) \Rightarrow It produces equally spaced vectors

\downarrow \downarrow \downarrow
start end no of values to be made

Prob 1: Draw a circle with centre (1, 3).

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hold on \Rightarrow it is used to plot different curves on the same template.

legend(1) \Rightarrow it is used to show different curves of different colours

~~subplot(2,2,1)~~

subplot(2,2,1) \Rightarrow It is a function which is used to plot different curves in the form of matrix

row color current pos

plot3(x,y,z) \Rightarrow 3d plot

comet3(x,y,z) \Rightarrow It traces the path of the curve

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CALCULUS LAB

syms \Rightarrow keyword to initialise variables without value

diff(a,b) \Rightarrow differentiating a wrt b.

function

variable

solve(a) \Rightarrow solves the function.

double() \Rightarrow preferable data type.

for i = <start> : <increment> : <no of iterat> \Rightarrow last line use end
action block

subs(tx, x, ci) \Rightarrow It is a function which substitutes

into
for

sub
x with c(i)

sprintf() \Rightarrow formatting print.

if (condition):

└