

Matlab 2025

- "Enter" command لكتابة
- "clc" command window بمحيط كذا اشي على
- "clear" workspace بمحيط كذا اشي على

workspace
بظهر
فيه
ar values
للأشياء

command window
بظهر
فيه
operations
التي انت
بتعملهم
والcommands

$a = 5$
 $b = 10$ } we can perform any type of operation $+ / - / * / /$

but there is a difference between

$a + b$
 $w = a + b$
 $w = 15$

ans = 15
اذا ما علنا
define

للcommand

اح يحفظه بار ans

بالتالي اذا علنا أي

command

ثاني اح تروح هاي القيمة

لكونه علنا
define
بالتالي القيمة
اح تفضل
محفوظة ب w

VECTORS

$$V = [3 \ 4 \ 5]$$

$$C = [1 \ 0 \ 7]$$

[] ← vector مكتب

space between
entries

$$\rightarrow V + C$$

$$\rightarrow V - C \dots$$

$$\rightarrow \text{norm}(V) \text{ or } \text{norm}(C)$$

$|V|$ $|C|$

$$\rightarrow \text{dot}(V, C)$$

الترتيب مش
مهم

$$\rightarrow \text{cross}(V, C) \text{ الترتيب
بفروق}$$

$$\rightarrow \text{proj}_{V \text{ على } C} w_1 = \frac{\text{dot}(V, C)}{(\text{norm}(C))^2} * C$$

$$\rightarrow \text{proj}_{V \perp C} w_2 = V - w_1$$

→ اذا بدى اوجد
unit vector
بنفس direction
لـ v

$$u = \frac{v}{\text{norm}(v)}$$

→ اذا بدى
Column
Vector
او transpose
بشكل عام

$$d = [7 \ 8 \ 0]$$

حرف
ط
بالkeyboard

$$d = \begin{bmatrix} 7 \\ 8 \\ 0 \end{bmatrix}$$

أو

$$d = [7; 8; 0]$$

→ doc norm

يستخدمه
اذا نسيت
لشئ هذا Function

→ distance
between
two vectors
or points

$$\text{norm}(v - c)$$

ما
بفرق
الترتيب



no
Keyboard

برجك لاخذ
commands
انت علقهم اذا
بدك تعديل

أو بفرق
لو خطية
(ز)

$$b = [2 \ 7 \ 9]$$

ر ح يورجين اول اشي

الناجح على
command
window

وعنه ر ح يحفظها على
workspace

$$b = [2 \ 7 \ 9];$$

فقط ر ح يحفظها على

workspace

اخذ ال command
أو ما خطية؟

MATRICES

→ how to write a matrix? $\begin{matrix} \nearrow [] \\ \rightarrow \text{space between entries} \\ \searrow ; \text{ between rows} \end{matrix}$

$$A = [2 \ 4 \ 6 ; 8 \ 9 \ 10 ; 1 \ 0 \ 1]$$

$$A = \begin{bmatrix} 2 & 4 & 6 \\ 8 & 9 & 10 \\ 1 & 0 & 1 \end{bmatrix} \quad 3 \times 3 \text{ matrix}$$

→ if A, B are matrices with the same size
we can find

$$\rightarrow A + B$$

$$\rightarrow A - B \text{ or } B - A$$

$$\rightarrow A * B$$

$$\rightarrow A / B$$

element wise
multiplication
and division
(which means corresponding
entries are being divided
or multiplication)

→ if A is a $m \times n$ matrix
and B is a $n \times l$ matrix

$$A * B$$

we can
find their multiplication
because it is
define

→ $\text{rref}(A)$ to find reduced row echlon form

→ $\det(A)$ = determinant

→ $\text{inv}(A)$ = inverse

$$\rightarrow \text{adj} = \det(A) * \text{inv}(A)$$

$$\rightarrow \text{cofactor} = (\text{adj})' = (\det(A) * \text{inv}(A))'$$

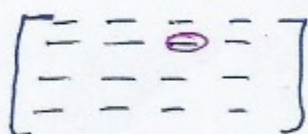
transpose

→ % comment or note

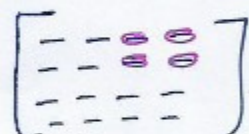
يعني اذا بدك تكتب note
لاك اكتب قبل الجملة (%)

→ What if I want to take just a part from the matrix?

for example $A = \begin{bmatrix} 1 & 0 & 2 & 3 \\ 5 & 8 & 6 & 10 \\ 9 & 0 & 7 & 0 \\ 5 & 4 & 3 & 1 \end{bmatrix}$

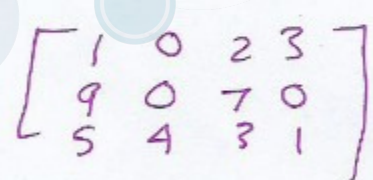
$A(2, 3) =$ element $= 6$ 

التي بار row
third column

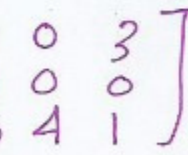
$A(1:2, 3:4) = \begin{bmatrix} 2 & 3 \\ 6 & 10 \end{bmatrix}$ 

first row no
second row
third column
fourth column

→ what if I want to delete this part?

$A(2, :) = []$ 

محوها
احذف row
كامل

$A(:, 3) = []$ 

محوها
احذف column
كامل

→ اختصار للي فوق

$A(\text{row}, \text{column}) =$ بي هاد part

$A(\text{row}, \text{column}) = []$ بي احذف هاد part


يعني بي احذف
column او row

matrix A
4x4

→ cofactor و minor الأصل

بفتح الـ
الأصل

General
Case

for example
we want M_{23} , C_{23}

- 1 $M_{23} = A$
- 2 $M_{23}(:, 3) = []$
- 3 $M_{23}(2, :) = []$
- 4 $\text{minor} = \det(M_{23})$
- 5 $C_{23} = \text{minor} \times (-1)^{i+j} (2+3)$

matrix قابلة
invertable

بفتح الـ
matrix $\text{cofactor} = (\det(A) \times \text{inv}(A))'$

$\text{cofactor}(2, 3) = \underline{\hspace{2cm}}$

$\text{minor} = \text{cofactor}(2, 3) \times (-1)^{(2+3)}$

linear system $[A][x] = [b]$

$[A|b]$

- Augmented matrix
- $\text{rref}(A_{\text{ug}})$
- simple eqns

$x = A^{-1} b$

$x = \text{inv}(A) \times b$

Cramer's
rule

for example
if I want x_3
b 11 $\rightarrow$ 18
third 14
column

$A_3 = A$

$A_3(:, 3) = b$

$x_3 = \frac{\det(A_3)}{\det(A)}$

→ Now we are interested in coding
at first, we need to open "new script"

$A = \text{zeros}(50, 50)$; → ^{rows} ^{columns} ^{من} ^{عشان} ^{ما يبطأ}

for $i = 1:50$

for $j = 1:50$

if $i == j$

$A(i, j) = i$;

end

لونه بي
diagonal

من 1 الى 50
1 2 3...

لو بي
تنازلي

$A(i, j) = 51 - i$;

50
49
48...

if $i < j$

$A(i, j) = j - i$

end

لونه
upper triangle

1 2 3 4...
1 2 3...
1 2...

if $i > j$

$A(i, j) = i - j$

end

لونه بي
lower triangle

1
2 1
3 2 1
4 3 2
: : :

end

end

if , for is

end لا

→ if I want to define a minor matrix (using the coder)

$$\text{CoF} = (\det(A) * \text{inv}(A))';$$

$$\text{Min} = \text{zeros}(50, 50);$$

for i = 1:50

for j = 1:50

$$\text{Min}(i, j) = \text{cof}(i, j) * (-1)^{(i+j)};$$

end

end

→ 1 0 2 0 3 0 4.. upper triangular بدی فرضاً
1 0 2 0 3 0..
1 0 2 0 3..
1 0 2 0 3..

$$A = \text{zeros}(50, 50);$$

for i = 1:50

c = 1;

for j = 1:50

if i < j

if mod(i+j, 2) ~ = 0

$$A(i, j) = c;$$

$$c = c + 1;$$

end

end

end

end

mod
باقی القسمة

$$\text{mod}(i, 2) \sim = 0$$

باقی القسمة 2 على

باقي القسمة 2 على