

Matlab Notes Eng. We'am anabousi

By. Sandrine Yamin

بأفكارنا_نُبدع

1st & second week

Strength of MAILABOS Hold building interned

- Relatively easy to learn
- Easy to do very rapid prototyping
- Matlab code is optimized to be relatively quick when
- performing matrix operations
- may behave like a calculator or as a programming language
- Matlabis interpreted perfors are easier to fix
- Excellent display Capabilities
- widely used for teaching and research in Universities and industry.
- Although primarily procedural, Matlah cloes have some object - oriented elements.

Weaknesses of MATLAB

nATLABS is a high - performance

- Matlab is Not a general purpose programming language Matlabis an interpreted (anguage (slower than C++)) it's designed for scientific computation and is n't suitable for some things (such as parsing text) Not designed for large-scale system development slow for some kinds of processes

MATLAB Stords for MATRIX LABORALOIN.

-> If there are two words with a space between them and I want to use it as a variable -> Use the under score sign "Space" is not allowed

Exa matlab course

-> the defalt variable of any oundefined operation Using mathab is ans [from answer]

BANA S. BOLANS S. 124

Ex8

3) 5/10 d+i

>> 8/10

d b

111

a b

ans =

* Scalar arithimatic Operations and bold story

0,500 0 0000 10 4

Mathelenages no dlu priMatlable lud OB Ex8 5(7+a) 5×(7+a)

alb right divison

PE side should Id-10

ab do ato

d+0

bla left division

* Note that when dealing with scalar 1 IT store unitities of the leftmandoright division long cire equal 3 but when dealing with the matricies is NOT 8 providab, Garrspoint lov alb=bla scalarsenso file A/B = B\A Matrix Chelle Ramaphe of any sundefined operation USING mattak & ans [Prom answerding Maflab Math 8x3 a+b polla « a+h a-b 2.0 a-b 0118 (2 q'b otto ab A908.01 note that this is exponantiation the molect (apo 1 2000 pt up) but when dealing with an exponential of db Punction, use exp(x) (DIF) 3 SXA 5×(7+a) all right division O

 $\Rightarrow \text{Order of precedence}$ $\bigcirc (()) \text{ ineer most first}$ $\bigcirc (()) \text{ ineer most first}$ $\bigcirc () () \text{ ineer most first}$ $\bigcirc () \text{ inter most first first}$ $\bigcirc () \text{ inter most first fir$

علنا وجود جرايات حسابية لما دغنى الأولوية احسب هن لسيسار كام اليمين

Sumo St of the reserver des also and a color color columnation dragoment marcheersame

=> Remember :

In assignment operators left side should be a single variable ONLY

Exa X+20=5 Emathmaticly right, but its Wrong in MATLab]

- stort with 10.V

* How to make Pascal stringer VV 05-2-2-

The assumed Engl

> Order of precedence FX 3 >> magic (3) >> magic (4) tent terranst first ans = 16 3 2 13 8 6 5 7 5 10 11 8 3 CJ 2 4 6 7 12 0 15 214 and alches antio later 16 4 Is my an him to the This is called a magic squar because the sum of the elements in each row, column and diggonal was the same The sym = 2n In assignment Doperators and E should be > Pascal's Triangle YJUO aldonov alprizo . The triangle is used to lock for the probability of any particular event to occur. 2=05+x syz Wrong in MATCH. * How to make Pascal's Triangle? - start with 1 c leave the middle empty 1) manue put the summation of 1) pland the prevenos row IT Where cts sizers - Repeat Ibs Command >> Pascal (n)

* Notes that ican use both the magic matrix or pascalis triangle of I want a matrix without Caring what's insident. parced

* Commands for managing the work session

Commans separate elements Command anous brommon

Clear about Removes all variables from

DOUNDARY

Clear V1 V2 Removes the Variables V1 and V2 from memory

exist ('vac') - Determines if afrite or og? Variable exists having the name (Var) by spare Or you can write exist var quit or exist no prostops Matlab 200

Who Lists all used variables Whos Lists the variables we used whos Lists the variables we used aver this dollar including it's size and and and including it's size and and and included are included

* Miles that ican use bolk the magic ¿ Colon ; generates an array having regularly spaced 3 elements & COMMON FOR MONOGING ENE WORK SESSION Comma; separates elements

15 14 up 10 fran array

300 1000 1000 vol Semicolon's suppresses screen more relidency printings, also denotes apolo new row in an array

" and IV establic Stellipsis & Continues aline 0910 WWW V2 POR MEMORY

Special Variables and Constants (1) daixy

command and amen and Description

Variable ends have

ans dollar Temporary variable Containing the most recent answer

Wind and event Lists all used variable in For ex if you write in the command window >>10/10 = (click enter)al the prevince really ans=0 asiz all philone matlab will save Is shall pranipomi prio II. your answer in the Macul (m) bob ND MI Dro avariable ans

eps dollars prispecifies the accuracy of H & Floating point precision 6=2.2204460492503130-016 656

354,5,6] (d. 6) toia The imaginary unit J-1, (190°) r,j

Infinity (a) Inf For ex. 7/0 = 00 1 = 218 (C

Indicates an undefined NaN numerical result (not a Number) Par ex. 0/0

How to represent amatrix with a The number TI world gate

ex & Vi- [1,2,3,4,5,6,7,819,10 note that you can over write an existing Variable for ex: pi=5 so pi becomes 5 and MFTT and to let it go back to the defined Value (saved) >> Clear pi

What if Hadni the add numbers

VEE [1: 2: 10]

* How to write amatrix using matlab Decressor 12223 456

 $V_{i} = [1, 2, 3; 4, 5, 6]$ or = [1, 2, 3; 4, 5, 6] or = [1, 2, 3; 4, 5, 6] v = [1, 2, 3; 4, 5, 6]v = [1, 2, 3; 4, 5, 6]

★ >> 8/5 + 7 @00
Is equal to

* How to represent a matrix with a regular step array is reduced and

ex 8 V4= E1,2,3,4,5,6,7,8,9,107

i write it as 1.810 to 100 to 100

liquic

what if iwant the odd numbers

V5= 51:2:100 1 I final value step Initial

Value

How to plot a sine wave using matlab of

- note that mathab deals with radian with all brigonometric functions
 - to plot use the commade >> plot (a, b)

Stleget Phe

X-axis Y-axis be the same size.

matlab functions are vectorized functions

Exe $Q = E_0 Pil2 Pi + 3 \times Pil2 + 2 \times Pi]$ b = Sin(a) Pil2 + qodz + boidan = 0plot(a,b)

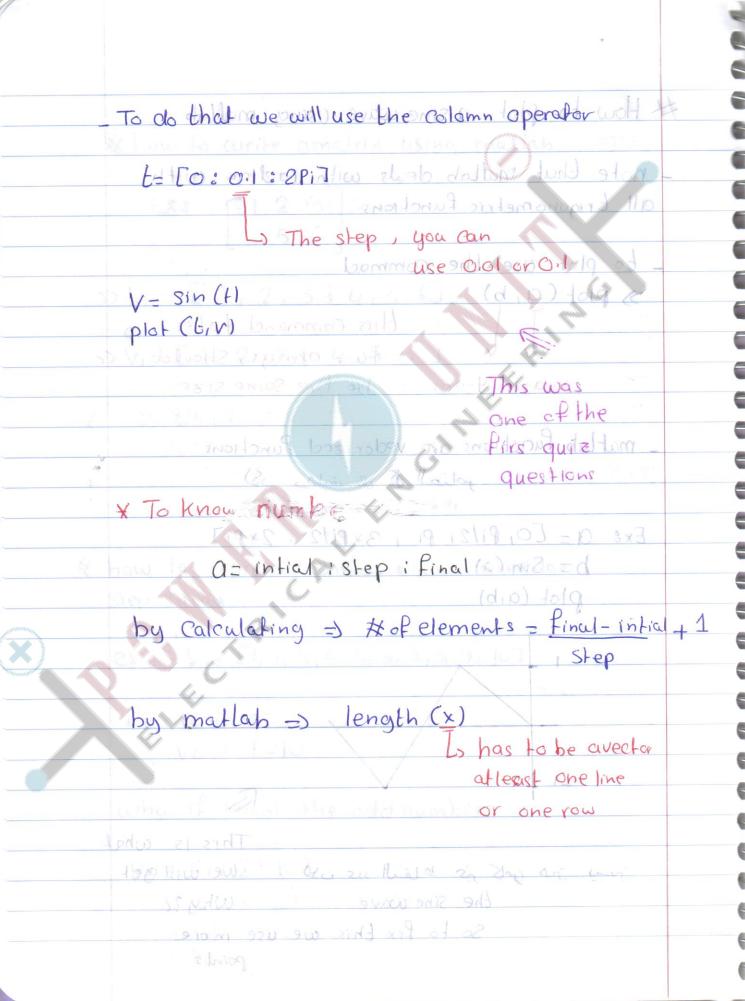
By Colculating = # of elementer Fraul- intel

dollar und

R

LENGTY

This is what We will get لان عدد النقاط عني كامل هت دينين the sine wave Why?? So to fix this we use more points



* Exa Plot One cycle of V= sin(TE) $\omega = 2\pi = 1$ # The number T=211 =) 211=1 =) T=2 >> E= EO: OIL: 2Jov out to soon de de la Con VERSIN (PixED GHLUM and all all al Plot (Ein) * Exe Plot one cycle of V=2sin (TH) T-2 >> E= E0: 01:27 730sov = 2x sin (Pixt) » plot (L, w) had a form of Unio tomo bonner 19 6 3.1416 This is the Format >> Formatilland » (° * note on Jandi : 141892.653.589.791 and In mather we write ego B+1541 but in matlab Juris considered to be avariable so align or >> Formal Shart due

We either Winite it as 103+ Jx4 1019 8x3 UV 3+45 TH- TS -10 # The number SIT GI Defore 1 or)-T but in the case of two variables of I have to use the multiplication sign V Plot (tous ** 7/21 => 0-3,6001 7/2×1013 0+3.500 Fb. Comes of 3x3 0 from 1 > 41/2 => 2 = 0 - 0.51 [Silloid] - 100 SV = DX SIN (PIXL) · Format long and format short(v, d) dolga » Pi ans = 3.1416 This is the formal short » Format long >> Pi ans =3.14159265358979 to take it back to the short formal re curite as aldones >) format shart

>> formal short e (D) P /2 >) format long e stability months exponential function mong هاي دنته ومم واحد دس قبل الفاطة العدية and the index must be positive EX soots (Phone Manuality) >> Format short >> Format short e >> 22017 >> 22017 ans = more and right - begin and I m 31.4286 3.14290+001 # To see the help decumantation for matlable] H S) demote t X D & T X HAD + YAD => Zeros / Roats et Polynomial And N click on help , help product , demo instead of using numerical abouts bookfind the roots, we just use the command's 2 your A Index Array: (Jeiel gege used) Tigen 6 Ex: 0 = [5 403]xS+5xH+ExE=(x)9 3x3 if i want the first element in the matrix T $\gg \alpha(1)$ oins = This agrower is the value of the 5 index number

>> a(a) ??? error massage because the inclex in matlah starts from 1 nt zero and you have to know that the index must be positive integer >> a(6) FLOCE COME ??? Index exceeds matrix alimensions

anxh + an + X + ---- ax'+ Clox

0.429e+001

=> Zeros / Roots of Polynomial Function 90 instead of using numerical ways to find the roots, we just use the Command 2001 A

>> roots (Polynomial) => s pont x90mT =>

 $E_{x:} P(x) = 3x^3 + 4x^2 + 2x + 10 P = 3 = 0$

5

5

5

-I Camile write the Function's mathematical in expression SO:- (DD) and location off insure of the = 211.

1- define it as an array il woitowod. Atom x »P=[3421] Curite the constants 101-1010 cres Ist and TAM » r= roots (P) gra * number of Coefficients in the r= (x) type where array should be the highest Lovis 1 The answer Order + 1 xml (squather (x) 0105) CONY $E_{x} = P(x) = 3x^{3} + 12$ 4 men and X NIZ >F= [3 0 01] (Cas X Trade March 1920) >> r= roots (P) or land - X MP » roots (E30017) QSINCX1 SIN'X AIZ Q, ×'-20) alian Cx (oprix Notbox Aneu > M. R.le

* Math. Function Libraryo no 20 1 andab 1 stille the constants Math Matlah OX * number of exp(x) CORPERCIENTS IN FRE Sert (x) and Should wond the highest owene Log(x) Lnx I + yebro Watural Logarithem e culusi Logic (x) Logx 0 IG -----SINCKI =7 Sinx (as(x)) Cosx r- roots Lanx tan(x) no Connolation 8 SIN'X asin(x) Cos-1x 5 a cos (x) 5 5 banx abancx ANN NN N A radian

X How to do files on matlah

We have different types of files such as

O > MAT. Files > if you were working and have variables that you Q M. Files want to save on the work space even after M you turn your PC off use I (Chapp) (

>> save name

your variables will be 3 × Saved in "name" and you can find them in us your current directory now if you want to retrive your variable 10:07 = 1 ()) load of pamer KEISV re

- 100000 provident the 10 1010 com

The second way is to write your commands other than on your Command window is to creat and M. file Charpertonia

B Debudy est purches that what File -> new -> M-File

VO

* Orth Panchadollow as 2919 ols of woll & File Du Edit Debug of Desktop window on help TR 1 click this thou are were and this and MYS have variable. that acu and apsuScriptuRile M-Files AD ave apage thous up turn your to off mo Punction File (Chap3) * Exe On an M. File write P(x) = 3sin 3t WENBERTAND WILLING NOU T=11= 215horno way you will see >> 6= EONO.1912 * pi/3] ou enteractive >> V= 3* Sin (3*6) bool (mode in the >> plot (t,w) -> Saveit as script file Among way show as i word blike the Soto runditico basanass vago commandedes orwolamba M. Ple () Debug -> run (F5) Or or & JEO ora from the command window

-> Write the name of the file, press enter ? and x it will run by it self Twank to write " mollab Equice" Mallab) G = belgi ost H ex. where will the matlab search if you 16 Wrote r !! 1 ab surse' Cause matab will (i) Variables H of Most 59512 (2) Mathildibrary MUN 3 Current Directory (m. file) (8) V (C) (4) Search path of (5 error massage undefined function or variable » So if we wrote r a it will start looking from 1-55 when ever it finds it it will bring it and stop !! that's why it's better use -v unused variable and not over abrite on them # what wolir -> shows the files in the directory, the difference between them: dir & shows all files in the Current directory what: shows only matlah files >> PWO -> to see what is Ewhich your Current directory

X The string variable and a small the state 14 will run bail self ex. I want to write "matlab course" Mallah 1 Couldal das)) V= matlab course X wrong D) V= 'matlab course' Cause matlab with look for the Monov () numerical value on 3 Size = 1x13 (1.1. of the word on D) (2 Onstation Massage Under Product of a Cotation 2 (1) (1)) V(3)E Priston A Locking y stone sus fi as a Prom 1-5 Europe Ever I Proto 3 - 1 more it and stop that that why the bell uses an UNUSED JUCKARDE AND NIPLEYED ON BAUNU # s/What as dir a shows the file in directory the ofference here here here a dir & Shows all Piles in the Current directory files 1) Poud is to see what is Ewhich your is ?

* Commands for Plotting X lobot X (ime (second))) R anxi+ arxis bit - a l'appellow ' ladol P File Edit View Insert Desktop window help E A D Q Q M C ----FLANDE BY CHECKING Capacitor Voltage SEP X now of thous Hi Great (max value) Elme (secondy # How to add labels: >> fifle (' Capacitor voltage') Arens 1 The Command String array

* Commands for Plothingsinn prints shi >> Xlabel (' Gime (second)') >> ylabel (voltage) * To read any value from the figure s1:7 1) From the Fraure by Clicking IE or Que to Ind C [x y] = ginput (n) Jr ور النقاط if i want to write on the figure >> gtext (' max value') # How to add labels >> Lifle (Copacitor Voltage')

X Solving linear Algebric Equations d-XA A 1-A $Q_{11}X_{1} + Q_{12}X_{2} = b_{1}^{2} - 0$ az1 X1 + az2 X2 = b2 - 0 TCONF, MULLIPH V putit in One matrix equation b XN 8x3 ans appellion br 2- ND- VE CIZI QZZ X2 615N8+X27 Coulum 2x1 2x2 matrix write it in may Squar matrix 2×1 5 Ax = b -> One matrix equation but in matrieses there is no division So I take the inverse 2nd use invite which will give repourties $X = b A^{-1}$ volor volgememberstheni identity matrix * SO A-'AX= bA' is a EELA T= AA'= O ((× A'A + A A' < Wreng dx (D) VAL = P(C (1) p = X

& Solving linear Algebric Equations d=xA $A^{-1}Ax = A^{-1}b$ $b \neq A^{-1}$ X = A-1 bid (1 voltaber) 0- -2x1 - 52x2 +1X10 2x2 2x0 Or sitist coroney XD I comp multiply X EZXIDUSIZEXIVLAND AND AN INLA * Exa Solving équations by matlab ND 3x -44=5 50 021 5x+3y=10 CY O First write it in matrix form sure voup? Exi v 3 - 4 b= 5 5 3 10 A= 10 A X = b --- > Ene molrix equalice X= b but in madriceses there is id 'Acix So I Loke the MAVERSE 2nd Use inv(x) which will give you the inverse of a squar matrix - Ad = X VINNI N. L. LASHI » a= [3,-4; 5,3]; 21 'Ad + xA'-A 02 >> b= E 53 1073 prove)) = inv(a) * b X= q(1) y=q(2)

* Anothe way to Solve it is by using the back slash ,51 09 A = inv(B) * A11 Ex8 5x-44+32=10 3x-Z=5 Stad inter in the stand material band Rili + Rolic A= 5 -4 3 B'z Ruin + RZ 01 E1 8 + 2129-3 0 6 ()D -- +1+ = 1 > a= [5, -4, 3; 3, 0, -1; 0, 1, 1]; >> b= Elos 5; 3] 16 1 Wold 21 211T S) q = mulal + br a no ad blund and ul ORC - Write the fille ostall wate - ed/ por was O O 32 NOTINOM NO 27- WB &VO VI = The lost number in adountanives it of

RI Rz R3 R57 R4 Find ipizis 1 14, 15 Using matlab $R_{111} + R_{414} = V_1 - 0$ - Ruiu + Rziz + R515 = 0 -- 0 -R515+R313 =- 2-01-11 = 12+14 --- Q 12= 13+15 51,1,0,1-,0,2:2,P-,2]=0 C This is How 1 FERRIOIS = d (C Solution should be on a script file, - p (C - email if to woonabousi Qyahas, como - copite the title as (How 1 - your name) Save the script file with your name Due date is on Monday VI = The last number on your university number V2= 2 X The last hum in your id hum

Riz the last num in your united num R2= 2× 290155-10,01,020158,00,8]=0 R3= 3× 11201-101-11:00-10,00,010 Ry=4× 11 251-10,1-1 R5=5× 11 iFoioid. $R_1 = 8$ $R_2 = 16$ $R_3 = 24$) M Ti3 M ×184 = Ry=32 Yis R5-401 22 Vĩ =8 _8 + Bin + 3214 =0 811+3214=8 - 1 -32 14 +16 12 +40 15 =0 -0 4015 + 24 13 = -16 -- (3) G = 12 - 14 = 0 - G 12-13-15=0-5 8 0 0 32 0 B= 8 0 16 0 -32 40 0 -16 0 0 24 0 -40 1 -1 0 -1 0 0 -1 0 0 -1

a= [8,0,0, 32,0;0,16,0,-32,40; x) 010,24,0,-40;1,-1,01-1,0; 0,1,-1,0,-1]; h=[8;0;-16;0;0]; NS = 24 2 q= inv(a) *b M 8 + 8ii + 3214 = 08=11=32161=8 ---32 14 + 16 12 + 40 15 = 0 4018 + 2413 = -16 32 8 2

| * Computer, Simplified Block Diagramping of Alphons # |
|---|
| i would be used as a would be a compared and a score |
| - Relatively easy to leave the carin to beauting the anti- same |
| Control parquier Software so or or of prod - |
| - Mattak material alar ad at 1 Operating 2 System Halton - |
| perform - APPlication monograp |
| - may behave like a calculator or as a programming language |
| Input > Processor > Output below in a pollom |
| Excellent display service Liver 1 (CUAD) and the Hallence |
| - widely used for teading and reserve in Universities |
| Hardwares pyterby byte |
| General purposed 200 Memory Unidos org N Support - deported IA |
| hardware operates strements babana baido |
| under software Control |
| # Weakn 20 Came as made # |
| * MATLABS is a high-performance I first two |
| Language For bechnical Compating. Lasnespoquestions intelled |
| It integrated Compationano) betergether first zidellom. |
| usualization and programming size voguizapizato esti- |
| in an - easy bouse environment whereand and not not udding |
| problems and solutions are expressed in familiar problem. |
| mathematical notation. MATLab is an interactive 2 2 wol2 |
| system whose basic data element is an array |
| that doesn't require dimensioning |
| - MATLAB stands for MATrix LABoratory, Chusch |
| - minutes stands for minute childrandig. |
| |
| IN a Left built |

Malab NoteBook

UNIT

Eng. We'am Anabou⁄i By: Sandrine Yamin

بأفكارنا_نُبدع

3rd \$ 4th weeks

We have two ways to write commands? 1) Script Files 2) Command Window which regult the other to a The advantages of Using the script files -> you can save it , you can Change in it when ever you want * if you were working on the command window and wanted to save your working y use the command diary this session need card toon for » cliary space the name you want to save A We have two Atriosetics enors and to stop saving D Syntax From 1 and >> cliary space off sub rouse and and worked note sound using this, method will saveling your work on a text fole Ewhich will save de at like a screen shot] * How to write comments using matlab; which will not be combiled, but would be there for the user to read use % sign >> % what ever you want to write E will appear

in green

* Programming Style 1 1- Comment Section 2 file name + key words > % programer name + date . List of variable > 1. User defined functions 2- Input section 3- Calculation section 4- Output section * input Commands & To let the user choose the variables =) For numeric values > Input (to Train of aland) To String Detu For String values » Input (O Whatever you want (050) 6 € S here to show 6 it's astring velue ŕ

Exe share sitted and the start in the start is in the start is in the start in the start in the start is in the start in the start is in the start in the start is in the start is

> as you see these number Command are the ASCTI Codes of the letters multiplied by 10 Cause it's not anumerical value

» The Command display broutof of the 60 display any variable you want (numericoner string) about the

Solisp (Variable name) 12 222

1

* The help documentation

-> Write doc on the Command Window you will get the help Browser -> or Click on help -> or the Command Lookfor

Lauros tan Will Composen

* exa iwant to search the inverse function

>> look for inverse >>> help- inv

Lynn and in the help command you have to know the exact lynn and spelling of the function

>> doc innto Ly will open in the help browser

* Relational Operators low on point (

Oreater than or equal less than or equal Less than or equal

Greater than

rot equal

note & v = classigment operator, not = relational doperator, not

>> 5+6/3>5 This is a logical statement The answer is * The Commander AD True) 2201) /2 Palus on our source up (1-) e 0) bride stand. 100/1001 values His wond to (mitinumerical values) I a scalar Narrable *examples& >> x= [6 3 9]; \$ 576 VI V >> Y= [1429]; CINS = Product 21 DD Z=EX74 5==6 »Z= * The O'dm Oand find anst if gives the the index not hen ow 5-=6 ponto sol will Compares CHO element ans= by element xabri art * note. that xiy should 9 stude 11 be the Same Size ovas the Lawit get anerror massage.

SS BURGESS & THERE a lock SXXS - SOL >> Z= 1001 The answerex Esc =5 (0 * The Command .001 >> Class ()) S> Class (Z) gives upu the ans= Variable kind logiced rocheel Julyes > I can even compare an array with a scalar variable >> X>8 ans= array which as etc. L'o y d' 20 sign telle * The Command find it gives us the index of hon-zero elements I in the array > X=12-2 043 >> Find (x) >> ans = 13 Em The index it starts from 1 nºt Zevo

Find (logical statement)

x = E 6 3 9 11] y = E 19 2 9 13] x = E 19 2 9 13] x = E 19 2 9 13]x = E 19 2 9 13]

2 C The index of true value >> Find (x54) ans=

AVR R

So the Find Command give us The avray index of non-zero value elements → Logical index of true values) 5

* input arroument of arrays () (* To get elements from an array) array variable (Index (Positive Integer))

X (3) X Tindex (Cirray))

رجعلى العنمر او ٣ في المعنونة ([[31]) ×

-> X (logical statement)

(حجلي عنهم العنمر الي عنوا العيمة محدقة

 $\frac{1}{2} = \frac{1}{2} = \frac{1$

note that the difference between the find command and the imput avroyument of an array is that one gives you the value and is the other gives you, the molex

3 = E 1 2 3 4 3 3 = E 1 2 3 4 3 3 = (x < y) 2 (x < y) 3 = (x <

Hardy Main herry of bags (1) 12

(Langlots Leven) x (

______ 2 ¥

(

1 5000

* Conditional Statements O If Statements 3 switch statments (Chap 4) @ How to covite if statements @ Simple if statement) Cogal = X The value of k ' faire) if condition note theat fi Commands end Onty ane - 1 o Candition 219 a more conditions will bed =N Compiled 219 if Condition 1 and wel-10 Commands curite bug elseif Conditio 2 elseif as Commands one word elseif otherwise Commande we have else to write end Commands after end each One

U

1

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T

* Ex & y(x) = [15x144x2+ 10101 x 7,9] * 10x-41019-100exc9 (Charp 4) sitch statments XCO 10 X = input ('Enter the value of x !) 17 X>=9 A MARINE y= 15 * sqr+ (4×x) + 10; elseif X>=0 & x<0 a more conditions y= 10 * x + 10 La Ehisis right else 1 but ibe don't ?! y=10 have to write end 6 Spt/ Cause 1771215 was serit Wow + getiesto elaton those Command 9219 Commandis

* Loop Statement While (Oondilton D For - loop - C- MANDE (2) While - loop 11 01 2 this is the For 1=m: Son Find starting step cop O Commands KiEm LAD Kedponiad end mits real asite Wyou a partie a dory Khy a Police condition of the offer * example Cab di m=0; x(1)=10; who part - 100 100 Por K= 2: 3:11 m=m+1) x(m+1)=x(m)+k^2; For loop x end 38=X(K) 3 OFN C This means BSSX about the tig it ladds elements It X = X NORD MEON array & XX = = (Y) P This - is considered asimple statement لأن يدر اللـ 200 قليل

While Condition Commands end

0

-> This is aloop Condition will keep on repeating it setf as long as the Condition is satisfied (true) when it stop being true it will step cut of the loop -> Variables have to be defined > Our variables should reach the Falus condition to get out of the loop cause if it didn't we will get run-time error cole(1)x to m

x = 5 x = 5 x = 5 x = 5 x = 5 x = 5 x = 3 x = 3 x = 3 $x = 3 \times 1$ $y(k) = 3 \times$

* Chap 2 sade hill as the land a lot of in zno) sugnort she sus one dimentioned 1) matrix Elxm] ENXMI Are clar le 21200 Clar -> & -> two dimentioned array ENEM 1A1 = macynitude , we represent Vectors in 3 dimentional arrays > To represent a vector () magnitude + orientation @ bake its components from X1412 $\vec{v} = x\hat{1} + y\hat{1} + 2\hat{k} \qquad co cio$ in matlab QB 923 One dimentioned array that is ex8 X=3194=4, Z=80 400 and 3 4 87 8281 - N 8 K3 K So in matlab we write the vectors as= one row or on Column

ال Charts in the site of an lange eden (1 we use the transpuse command (1) Ares class la lass class A= Quint and and an 9m azn Q121 Q122 Q123 Televeral VECLORS IN Clam Ami mala -1 NO. KOLNSIDD A an azin my durangenami a22 7 - - AU - TX -Q12 923 Q3 in me 0 Clin azn REELPEDam ex9 V= 358 580 87=V ex8 V1 = 3 5 _ note that this dielwit 8 Change then to change it レ=レ'

>>r=[1;4;5] r= 1 40 hnow the final 5 r'= 1 4 5 V= ¥ 3 r=1 5 4 2018-0-5 EVIr W= I can build and w= a matrix using dv is other matrices hydred Exile ner the same number of 10 [3x2] matrix that is built based on handr (u)i 3; ~) W2=EV;r3 W1 = W2 = 3 3 5 3 8 5 1 8 4 5

W3= [v'r'] W3 = 358145 W3= [レッシア] WSZ 358 145 لبقتر 🖋 st as "istast might C. Post 11 ap Size Jugi · WE= [WIVJOD 27) error asing == X horz cal all matrices on arow in the braketed expression must have the same number of rows 18x23 maline For For but based and grace 4

To know the final value in v that will reach to m

hom -> it has to be an integer

=> humber of elements

if I have look to here elements in Can be reperced of a <u>mi-n</u> or ly space elements) said elements) said V = 5:0:5 = V

this is equal to 31 out sen I

8-5 +1 = 31 0.1 +1 = 31

value final number

spaced element

another way to write the vector When we don't have the step, but we know the humber of elements

their Value of clement 12

a = lenspace (am phik) 1 a with equivelend initial and your of all by space) XX What if we have an array that is linearly spaced logathermically visually and add with the state 100 100 1000 100 100 1000 100 101 102 103 24000001 001

if I take logio to these élements it can be represented as linearly space elements (logathermically space elements)

I use the Command Log space (G, b, h)

If Im nºt Using mattab rean O find the array by

10° au 10° d

12 and avoil 1 number et

Vice 19 7 a readance delements sur

Step= b-a n-1

¥ Example like Logspace (-1, 1, 4) Find the array DRA -1+2 C 10 3 2 10 Step= 1--1 * you should be able to know all the difference between NAV = pkon D Magnitud & length of a vector HONIT OF COMMOND Blength & number of elements in avector but this along water 3) amplitude of benegth with complex numbers (*** *) + 102 absolute value (ii) [2 -4 5] x [2]) - [V] YOD

× Exe X= [2 -4 5] (3 11-) 900 a= E1 2 3;456] » Length (x) sth 01 Check it in matical >> length (a) The magnitude of avector Mag= / X2+y2+22 Magnitud Bealerster of ed to Findit sqrf(x(1)12+ V(2)2+ V(3)2) but this along way Alw source Can use 1000 Sart [WXW) (4) absolute water and sqrt [[2 -4 5] x [2]] = [N] -4 5

* what if i used (W * W)

That will not give me a statar value 3×1 × 1×3 The size will be 3×35] (which is coroney in this case!

Size I aril

>> Norm of a vector = magnitud Conly to vectors)

>> norm (vector)

>> To get the length of complex vectors use the command abs (absolute)

Saps (-4) ans=

4

 $abs(4+3i) = \sqrt{4^2+3^2} = \sqrt{16+9}$ $abs = = \sqrt{25} = 5$ 5

>> abs (-4+31) ans=

h

>> abs([(2x-4) 57513) Lovos ahs= 2 4 7.0711 >> horm ([2 -4 5+51]) ans = 8.3600 Knorth 12 butinoon Q 1 OMBRUMO Keon + () (+ w) and a min to () + ed Da

* Indexing sand addressing 10 woll * 1 a mut (1) element 1 S) X= [2 -4 5] X(2) (3) to be γ ans= -4 A Log Dia shi Dig als A >> × (203) DED MEESD X 55 ans 20 usD second e P de side 204 JUND WALLS SUDE FUD ans= 2-45 What if iwant from 2 to -31 de ans - confrar - 2 X (2. - Li-B) - to write it this We way is wrong because it should de be positive interran le of all a that starts from the the lights call - Chitazerel Ligai - atro 11 toget - -5 (2 stallog 2 s 3) + 15

X How Can i get behe binder of obit X a matrix element for ex >> B= pascal (5) 915 QII C113 alz 0114 Olzs a22 Q23 a24 021 935 934 932 (133 931 Ca 45 aug 942 943 au 030 054 ass 053 0151 s bilenelland »b (11) ans-Cins = The value of ass Hard Way & Daigos > b(2:5) ans= 4 it will ap did on allo input al saw us glips output I is Irput Il Usla is arow the output is aven

sh ((2:5)) ans= looks and salt through I had it 15:52.31 etwabni · ('Elonge à >> b (:) > The output Column vector has all the elements of in the matrix B (1:8) will discontration (كل المصامر دادي بترجع ك شكل كامور) R (liend rend) a gnother way to get elements from a matrix Colu B -12 That the range of idean ti big i halos it is what if swant these or or B(:, 2:3) B([234], [23])

What if i want the 5th Column B([? 15; 55]') y indexin B([15; end]) B (1,05) addressing B(1:5,5) 21. Wash B (liend rend) 9 A= 10 7 11 8 12 7 11-; 8-12]) Ti put it so that the input is in the form of 2×2 matrix & the output is also in the form of 2 ×2 matrix. i B(1,2*3)

* find : index non - Zero elements [7, b, w] = find(p)Z = Find(b)p index of non- Zero elements. $m = E_1$; 34] 0 now colom $\begin{bmatrix} a & b & c \end{bmatrix} = find(m)$ Same Value number in mattab EEE Sum (b) 2 6 = 3 4 Eable find (m) (m) the to addressing without the same value. max (b); b is amatrix. => row vector . colour. I is signed is reader E01 4 -8] max (vector) no maximum element in the array.

min (b) no minimum element in every color min (Vector) minimum element in the vector. [a, b] = minor max min on & the index of Emicipal mex value the etements e sous de بل عامود. >> Size(b) mo 575 in matlab [55] Sum (b) Sort command . m= magic (5) المرتب المرتب تصاعدي الكل محامود. Sort (m) [2 - 4 5] if i want to change that. $\chi(3) = 10$ X = [2-4 10]

empty matrix is nit an empty matrix V= EO) 1x1 matrix this on has an element empt- 3 matrix means hers no elements V=E3 Lets Say holy at Salg EJ mn el zowamed el Zealtha abel 3 al pascal matrix = 53 E67 so Puse the delete elements of Columny

This all can be done by array oditor from work space NOVA SPace a b double Array editor 6 Change Chaf you Went 11 Vectors 1 dimenssional Array matrix 1 do 3,4 -- were gree how 10 Leik about 3 anray > Cat (h, A, B, C, --) low & col x

prati x Z A Z= Cat (3, A, B, C Ø -he matrecies Thave Er A=magic (3) B- pascal (3) No wahden 111 zala A, B,C) (3) page So the 2(1,1,1)= addressing ause 3 input legic Bar Ogel arroument magic 0 Zamod 0 cap 1 195 1 page page thats the 2(:,:,2)= -Hacher addresing pascal 1 Can W 2(1,1,3)= Unes

Eur' e Z1- magic (3) I.C 2 climen Z,(:,:, 2) = pascal(3) 7. (:,:,3) - EII 1; 111; 111] loter curdle So if pascul (3) 2,(rah ysbeha 4 rad am page Znclo W= by mechin Jn addition and Subtraction element by element operation VN = r+b W= 5 12 W= f- h

W=r*v it's wrong Caus 3mlejet el darb 3'alt ceuse Grov mfimes I hver matrix dimensions must agree Only be scalar bobot bekon cloment by element =) the Dot with darb + 85men operator assos when u ase it before * darb bseer Brdy element by clement multiplication Carray multiplication et size lazen y+13 natso thats why lazer both ykono some siz rxv matrix multiplication (without) the dot openutor)) array exponantiation Darrey division

PECI 23 P12 Nond aug p el sizo Correct jL to bren 3'al 61 Por Z 7. D 25adha 3a Zaha cimal Punk E B This is bight Cause away wahden decen; et tenych Operater AL LA The second

Error Wrones Sizi Vo XV' Y+ WI ans = Course same size 48 x-27 7 eg Sing(x) Su S 4= 22 13.4/19 23,3707 55.7981 exp(4) * Sin(x) × (COS(x))¹2 Size(2) ans = Cone In the n's Wrong Second ause ghiz X and y are nºt Scalar So b706 dot 3nd kol 3mlyef darb Kal 3mligt 205505 Kel 3mlyet 85men Z= exp(y) = ¥ Sin (x) = ¥ Cos(x) 2

Sunday 5 exponetialion · eloment by elempt exponentietra operator multiplicatia matrex AXB m rpi lialia Ax.B arrow F BX B × X 0 we have special North raf matrix ne identy eye (n) 0 To epet meidenty meetro

eye(n,m) exs age (3, 2) AI=TA=A Cms = Its also Callod m= magic (n) eyel Size(m)) it's not the empty Zero matrix matrix = C 0) = (0)the In put arrequired > squar malrix 2-> nxm medris Zeros (Size nes matrix Mi= Ones (size) mi=

* Random matrix 8 » Rand (n) »Remel (n, m)) Rand (Size (n)) Ex: Fand (3) clich it twice you will 1 get (d) fleron dements although matriese Linha 3 sho Zyen low bely render matrix than el avaran mn 5-3 le only rand (n) x (b-a)+q die . 8 rand (3) *5+5 from 5 te 10

» magic (3) . * eye (3) ans = 0 0 8 O 2 C 0 Ourso the F'S multiplication ٢ Se maht nye >> magic (3) + eye(3) The answer >> magic of (3) matrix ans = to do rotation storgo (m) zay keno belbel arsam go" > Eriu(m) (ower traughe > trillm) upper tringle

>> fliplr(m) > FliprL(m) × i's undered command I function > flipud(m) NAME OF States of بلعت >> User STATE N (m, >> reprost 12 zin use his STRO ely bhaded tolad ha Bac m m 376 --

VI-E V7=5 The dot product command do6 (V1, V2) -Closs (VIIV2) Cross 5 det(m) determine (nr(m) > matrix D] = eig (m) EV ergen Value + eigen vector VA= ran m The Scular 1 khie is the are eigen an exercises Value Solver 1

* Polynomial multiplication and division STATES OF STREET, $P_{i}(x) = 3x^{3} + 1$ $P_2(X) = X + 2$ BETHE PI= [3001]; P22 [12] nrefher matrix multipliculie nor multipliculie >> Conv works here Z= (ON(P,Pz) mablesel tartes 22 6 -Smi - In-3x2+1 arrey 67 el 157 Bakes elcon equastra >> decenv (P1, P2) ~ ptroz el pratoets

> (00 (- 5 (Pi) Thave the (00Fs ar bdy argaz el polynomia Poly (r In this examp F= roots (Pi Poly(r) then ans= 0.33 -() This is the x malizo eno 893 Bala mosame akbor of So yoni Basmo 3a1 3

* Evaluation of apolynomial Z= 3* 2+1 " Mait matical 2201 Wa the Dalynomral Vulle of 1 mazner 2 V= Polyval Senoh Bac 1 Va ty val 1 25 OINS = andow Value N= porgver (p1, E1,2]) ans 25 21

Jow lot apolynomial Using mathing ticel Lha oxpression مع فالل شكل P1 -> Array S s pi array ex 10 Par C Xere 0 Q. 10 US poly val (PIX) Plot (x, C Make Suro arra mat lab Cless " 11 Bz 30 407 20 10 10 1 DE 100

Boly agmis PBPC+D rip ma Celi Cell arrey B arvau Sell Regabeles 26103 lalos cer (m) 2(1,1)= a= 'matlah class'; Ele 20; 30 40]; わこ 10 C= 1:100 ; d= Eaz Z (111/2 263 2 (1,2) = 2 (1,3) = 2 C 2 Z (1,4) = Ed]

[2x2double] [mat leb dues] [10] [1x100dod) Z Z nell has a matrix Struchture array Base aschar Base date Small QX 3 Studen Jam SSM marks 90 p25 3 T

How to write it on mentab Studento name - 'abmad's ni D Field ructure in array ì Called studen 5356 Student. SSh Z b706tha String arres laizno maz13b Beh Q or the studen Studen(2). name

Pili script file m-files (om) -> function file Zaval Klnoph lazen bringak yblash feh KIMEL Function "other than that il Ŧ Pile a scrip Mazyy and as inpul aut- put alloument Jake vewichles

defined fundious from Slide abs (3+41) S angle 6010 Imper number Grila Q. ja alinal (2.7) ans = 3

61. 2 1 le 2 Zers as grand -0 a 2.3. 2.7 -2.3 X={ round (x) = ns Ceil(x) 10, 2 21 Juny ans= 3-1 ار ص T \mathbf{x} 4 3 2 1x ins = 4 2 -2 2 ري ان نو اند الاساد :01 من الرغم

Syum Lynchica Sign(x)ans ١ 1-1-١ Skyn (EG-57) AND DE L -T T 100

* To represent Complex numbers 67 X= q1+ 1 b = A1 100 AZ 9= C+j d = $X \pm y = (a \pm c) \pm j(b \pm d)$ X xy = A, Az OI CZ Y/y = A1/A2 101-02 a) To verify this using mallab angle (x + y) X angle (x) + angle (y) 245) Kef Zowel abs dray my dearees abs(x) × abs(y) 19. radium

1 10

TAN -45 X-- and 57 -4 7 Length (Sin(x) D Sim(x) = ans= 3 ALC: N ol Zongor el if juant. anu 1000 Sib $\gg \sin(x(2))$ انته لعد الحجاد Paelicin cin(30)decix bdeer Sind (30) in Sin²(x) Sin'Z (x) Wioney 2 11 Martin)) sin(x).2 and Barn cip/ Trailo 100 6 Contractor 17-1

Sin (sqrf (x)+1) als l'ela ø Sin and C'C sart are vectorized functions Six -=> fan-'(x) atan (x) -> ____ afar Chave two Functions 0=45 Can 2 Ehat1 = atan (1/1) = 0.7854 theuf 1 Cheta 2= at an (-11-1) 0.7854 that's why we use 2 alans Vaters personal (a) ac would zashan Zimpul arrighmants

Chefa = alanz (-1,-1) 446.4 =-2,3562 2 gas lifer hagelen function Hungro Threase SinhCx 町町 新生 detined -un(T manel Sorl Scils functions [output varibles] a function filo = Function nam (impul Verribles Real Property in

Only Comments are allowed to be written before the Rord function, in user defined Runchion XEX a= fun (x,y) Punction [2]= Fun x, u) ZXX end brales I have one output argument bidar astany Zan el squar brackets but more thave to Put from

pol elé 1)07 wat el matrix maltiplicede Bat soc metl isp) 3 IXI 123 SXI Salve your program I can run it Script Rie after Saving is nstadset by typing it Kona name in user define au put the 104 Shout arroument input (3,7) P y 8 303 Cins =

ocal variables Q= [1:5] g [2 4 6 5 Luhi 15 De R (eng)h(Q A WI R WU A WICH WICH A RAN Como X = 3 V = 4 Q= Fund 2:40 12:40-(1.9) V: J. (...) ~ (1.1)

Fundrion esmo circle mozel yenseb e Sunction [C, A] = Circle (2×PI¥ V 5 A=-ZXIT Pixrx12 eno, ØU ascribt Theneme 9 門師 belon the arg F ciser defined versionables PI The second beton local 100

Show-derte Lanchion Today = date end Show - date today= 15- Jul-2014 Rowrite Glate FINOD Film Tr amenbe-Pariable (IW)-C metion hers the support angument

× inv(A) mentrix Sin (x) > rachin 3 functions there in put corregum Runchin Oir Lune Runction its. nor 21 Lic 1 CRE VON Zera zero Sum Pzera (Function nem QX. SiL -TI 75 humber of 三十分 Zeves Xo b dah 136eh Somen awalyen

Semal el sx axes adesh et han Indha et function - Zera = fzero (Sin(x), 0.2) Remembe This is wrong Sink) mesh nstad 3 cel sin. Bashan SC (Sin' 0.2) XT Zero ways - Chavaler array 1,10 have y expression