

Matlab

"%" represents the comments

";" prevents output from being displayed

Arithmetic Operators:

Addition: +

Subtraction: –

Multiplication: *

Division: /

Exponentiation: ^

Grouping: ()

Use plot(x,y)

and array $x=[10,3,5,7]$ $y=[5,3,2,4]$

to draw a graph(a line made up by points) with the given data

MATLAB Commands

```
>> x = [-2,-1,0,1,2]
```

```
x =
```

```
    -2    -1     0     1     2
```

```
>> xCol = [-2;-1;0;1;2]
```

```
xCol =
```

```
    -2
```

```
    -1
```

```
     0
```

```
     1
```

```
     2
```

While working on vectors

" ," are used to separate row values


" ; " are used to separate column values

$x = \text{startValue}:\text{spacing}:\text{endValue}$; — is used to represent a vector start with "startValue" and end with "endValue" spacing is the "spacing"

x = startValue:spacing:endValue;

MATLAB Commands

```
>> x = -2:0.15:2;
```

 **x** [-2, -1.85, -1.70, ... 1.75, 1.90]

0.15 0.15 0.15

i

Vector begins with ***startValue***

Spacing is constant


Vector ends on last value within range

if spacing is "1" then the middle parameter can be omit

the following pic shows how to represent a column vector

MATLAB Commands

```
>> x = (-2:2) ' ;
```

 **x** $\begin{bmatrix} -2 \\ -1 \\ 0 \\ 1 \\ 2 \end{bmatrix}$ 5-by-1 column vector

Function `linspace()` can be used to get a few sample points from a sequence(range)

Equally Spaced Vectors Linspace

0

8 Points

3

[0 0.43 0.86 1.23 1.71 2.14 2.6 3]

 v

MATLAB Commands

```
>>v = linspace(0,3,8)
```

Matrices

 M

MATLAB Commands

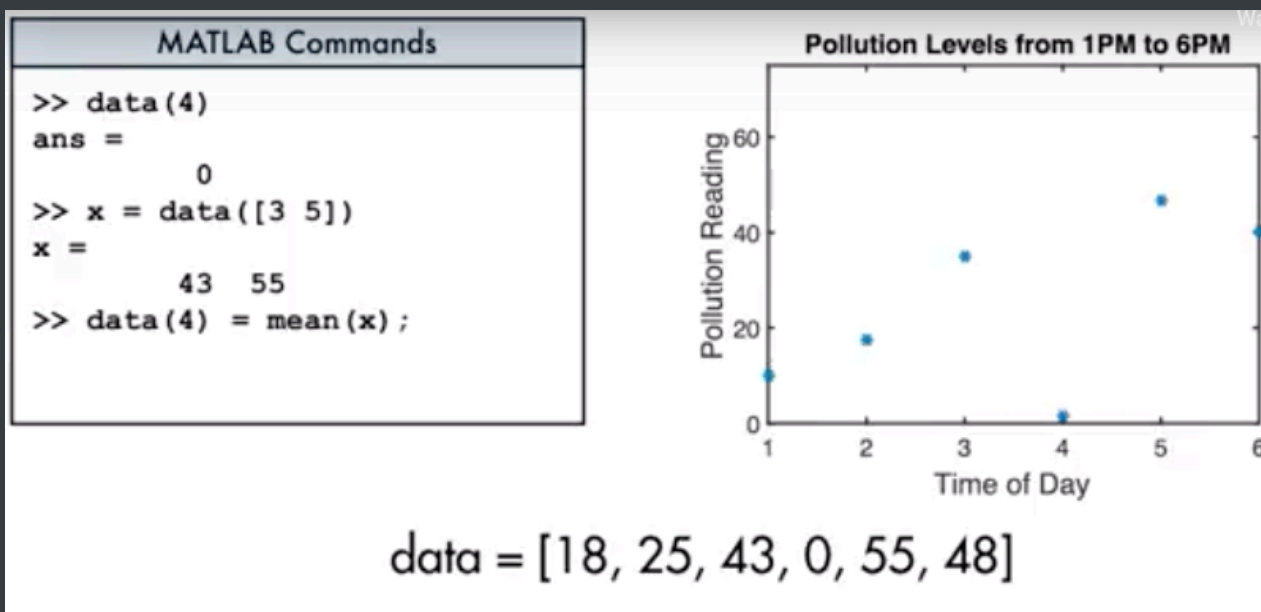
```
>>M = [1, 2, 3; 4, 5, 6]
```

$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

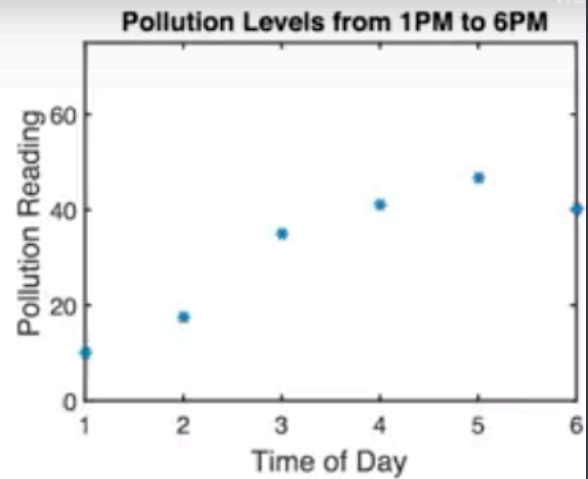
Using `length()` function to measure a array while using a `size()` function to measure a matrices

MATLAB Commands	MATLAB Variables
<pre>>> n = length(v) n = 24 >> [nrows, ncols] = size(A);</pre>	<pre>v <1x24 double> A <24x30 double> nrows 24 ncols 30</pre>

Access Elements of a Vector





MATLAB Commands
<pre>>> early = 1:3; >> afternoon = data(early); >> evening = data(end-2:end); >> mean(afternoon) ans = 28.6667 >> mean(evening) ans = 50.6667</pre>



`data = [18, 25, 43, 49, 55, 48]`
`afternoon = [18, 25, 43]`
`evening = [49, 55, 48]`

Matrices Operations

 `v1 [1, 2, 3, 4]`

 `v2 [2, 4, 6, 8]`


`v1.*v2 = [1*2, 2*4, 3*6, 4*8]`

`v1./v2 = [1/2, 2/4, 3/6, 4/8]`

`v1.^2 = [1^1, 2^2, 3^2, 4^2]`

`v1+v2 = [1+2, 2+4, 3+6, 4+8]`

`v1-v2 = [1-2, 2-4, 3-6, 4-8]`

 Element-wise operations

`.*`

`./`

`.^`

Row vector [2 -1 8.5 6 19]

 v

Column vector

$\begin{bmatrix} 2 \\ -1 \\ 8.5 \\ 6 \\ 19 \end{bmatrix}$


 c

MATLAB Commands

```
>> c = v';
```

```
>> rows = [1 5];  
>> cols = 2:4;  
>> subdata = data(rows,cols);
```

$\begin{bmatrix} 32 & 26 & 28 \\ 48 & 61 & 69 \end{bmatrix}$

 subdata


	1	2	3	4	5
1	18	32	26	28	46
2	25	42	35	30	52
3	43	44	37	52	54
4	49	38	59	54	55
5	55	48	61	69	62
6	48	34	56	42	56

 data

Using conditions to pick data from a data set (Matrices)

0.01	0	
0.02	0	
0.01	0	
0.27	1	0.27
0.39	1	0.39
0.01	0	
0.65	1	0.65
0.50	1	0.50

 data

 ind

 activity

MATLAB Commands

```
>> ind = data > 0.1;  
>> activity = data(ind)
```


MATLAB Commands

```
>> A = [5,2,3;1,1,0;2,1,4];  
>> x = [-1;2;1];  
>> b = A*x;
```

$$\begin{matrix} & \mathbf{A} & & \mathbf{x} & & \mathbf{b} \\ \begin{bmatrix} 5 & 2 & 3 \\ 1 & 1 & 0 \\ 2 & 1 & 4 \end{bmatrix} & \times & \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} & = & \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix} \end{matrix}$$

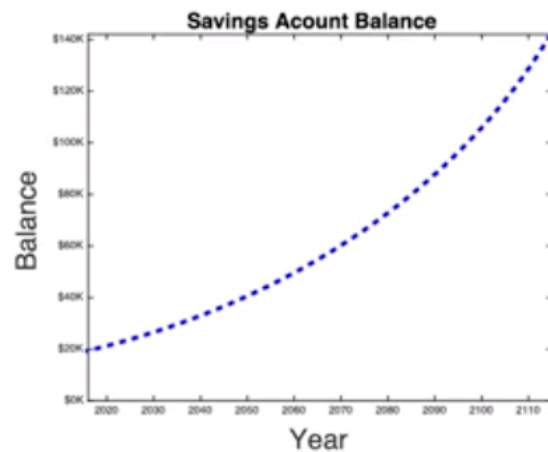
For Loop:

MATLAB Commands

```
r = 0.02;  
bal = zeros(1,100);  
bal(1) = 20000;  
for k = 1:99  
    bal(k+1) = (1+r)*bal(k);  
end
```



Run



Logical Variables && Operators



Relational Operators

- < Less than
- > Greater than
- <= Less than or equal to
- >= Greater than or equal to
- == Equal to
- ~= Not equal to



Logical Operators

- & And
- | Or
- ~ Not


if else statement


```
if hours <= 1
    fee = 0;
elseif hours > 1 & hours < 7
    fee = 35;
else
    fee = 5*(hours-1);
end
```

Custom function

MATLAB Editor

```
ratio = 1/2;
N = 5;
aSum = geoSum(ratio,N)
function s = geoSum(r,n)
% geoSum.m sums the first n terms of a
% geometric series with common ratio r
if r == 1
    s = n;
else
    s = (1-r^n)/(1-r);
end
end
```







 aSum 1.9375

geoSum.m

```
function s = geoSum(r,n)
% geoSum.m sums the first n terms of a
% geometric series with common ratio r
if r == 1
    s = n;
else
    s = (1-r^n)/(1-r);
end
end
```

Current Folder Watch later

 chebyNode.m
 fiboanacci.m
 geoSum.m
 legendrePoly.m

Using " \ " to divided two matrices and use " $x = A \setminus B$ " this to equation " $Ax = B$ "