MATLAB Tutorial

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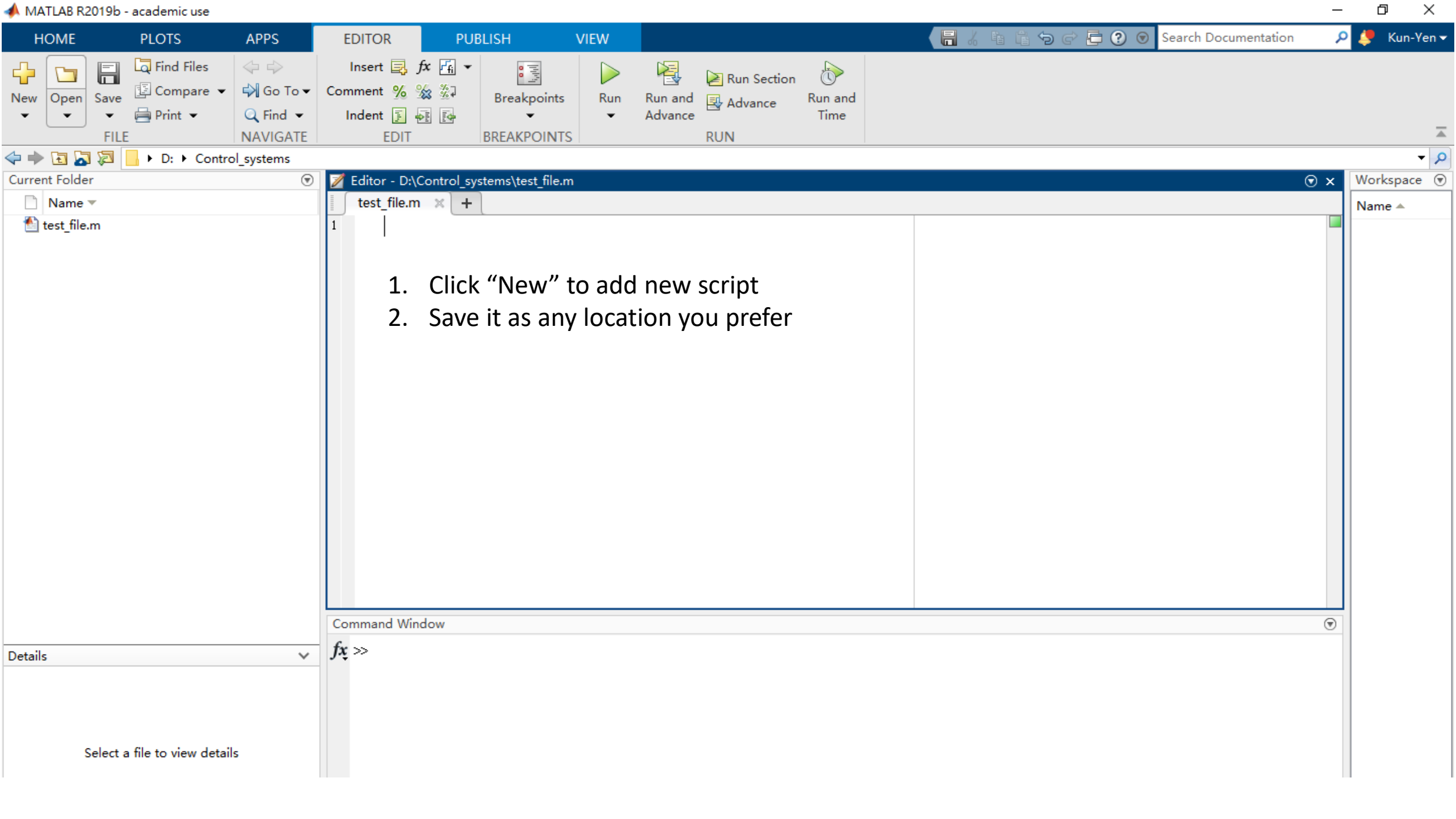
MATLAB R2019b - academic use
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1. Click “New” to add new script
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Basic Operator

+	Plus; addition operator.
-	Minus; subtraction operator.
*	Scalar and matrix multiplication operator.
.*	Array multiplication operator.
^	Scalar and matrix exponentiation operator.
.^	Array exponentiation operator.
	Left-division operator.
/	Right-division operator.
.	Array left-division operator.
./	Array right-division operator.
:	Colon; generates regularly spaced elements and represents an entire row or column.

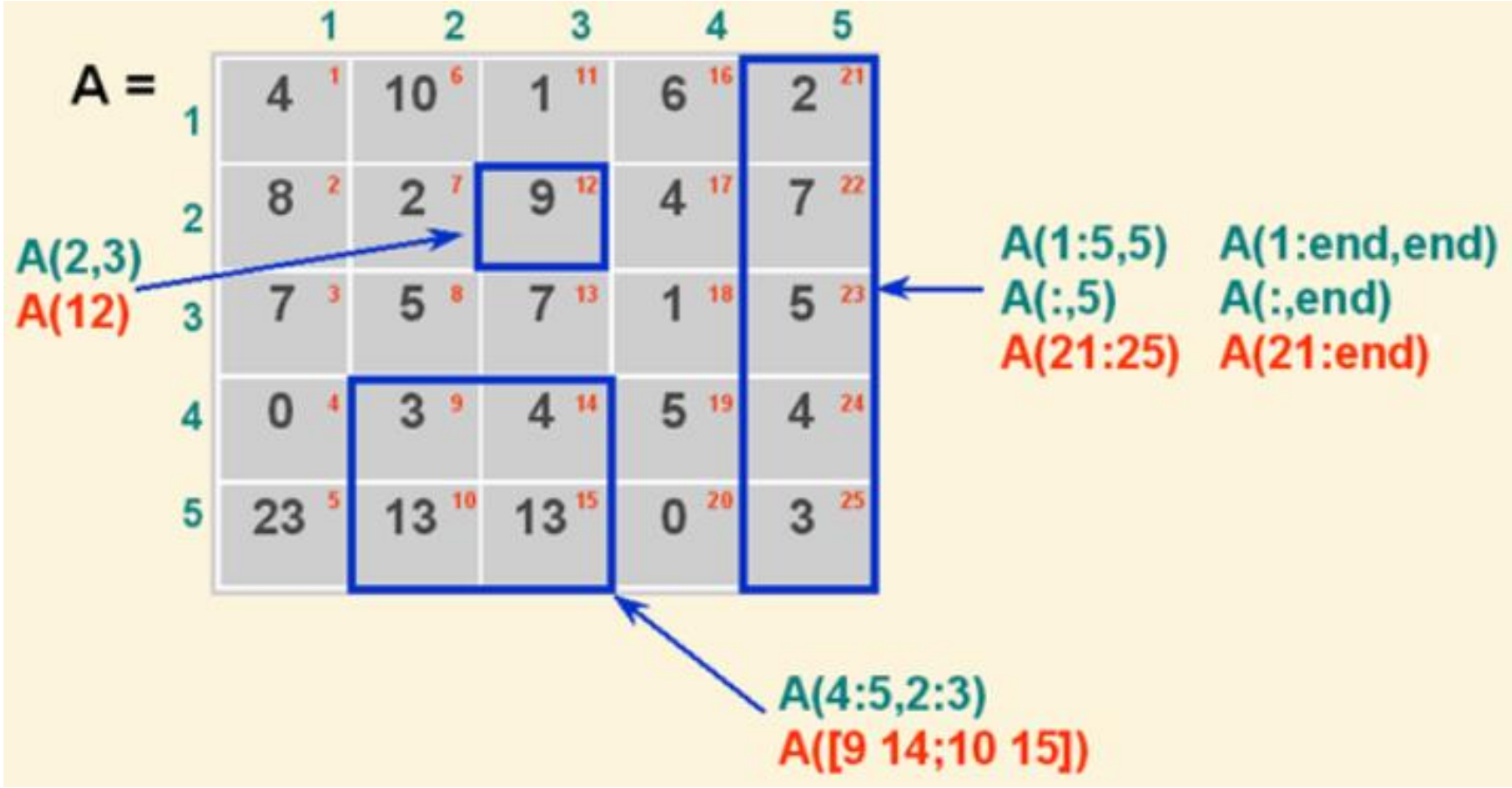
Exponential and Logarithmic Functions

`exp(x)`	Exponential; e^x.
`log(x)`	Natural logarithm; ln(x).
`log10(x)`	Common (base 10) logarithm; $\log(x) = \log_{10}(x)$.
`sqrt(x)`	Square root; $\sqrt{x}$.

Symbolic Linear Algebra Functions

`det`	Returns the determinant of a matrix.
`eig`	Returns the eigenvalues (characteristic roots) of a matrix.
`inv`	Returns the inverse of a matrix.
`poly`	Returns the characteristic polynomial of a matrix.

Matrix Representation

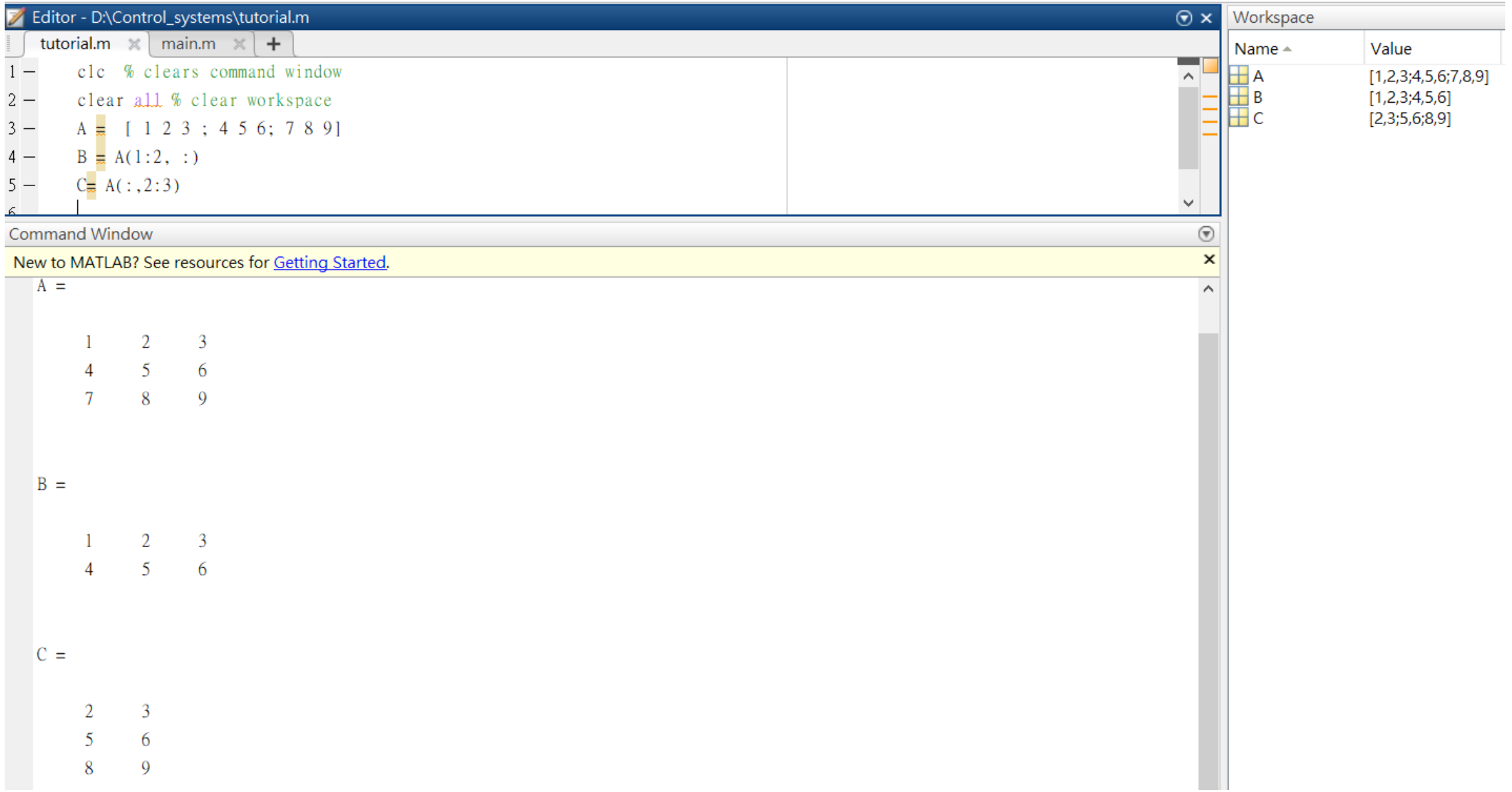


Noticed

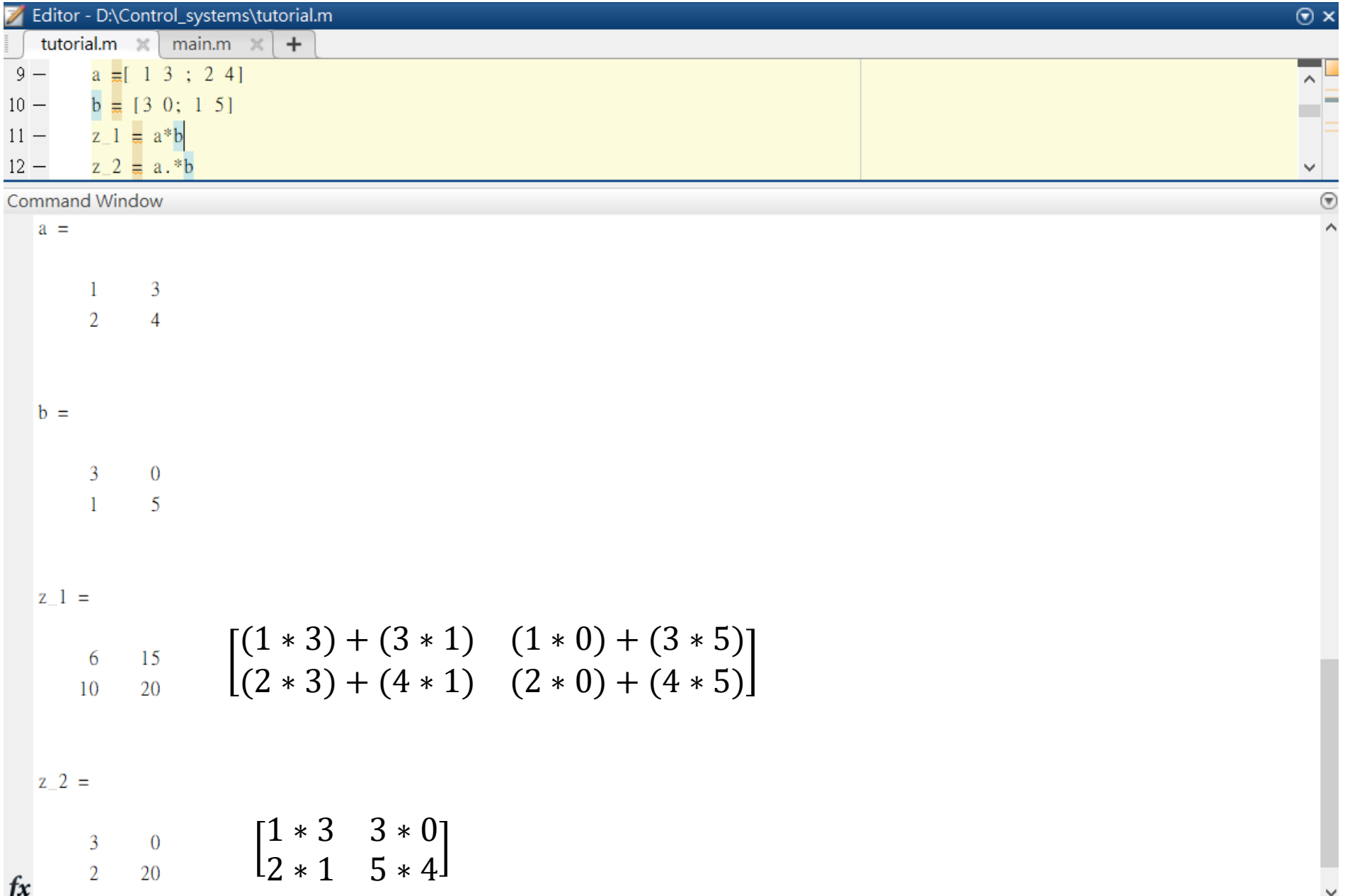
A(## , ##)

Column	Row
(run vertical)	(run horizontal)

Exercise 1 – Create Matrix



Exercise 2 – Matrix Multiplication



$$\begin{bmatrix} (1*3)+(3*1) & (1*0)+(3*5) \\ (2*3)+(4*1) & (2*0)+(4*5) \end{bmatrix}$$

$$\begin{bmatrix} 1*3 & 3*0 \\ 2*1 & 5*4 \end{bmatrix}$$

Exercise 3 – Solve Linear Equations

```
18      %A*X = B
19 -    y_1 = [2 4 ; 1 4]   %y_1 = 2*x_1 + 4*x_2 = 16;
20 -    y_2 = [16; 14]      %y_2 = 1*x_1 + 4*x_2 =14;
21 -    x_value =y_1 \ y_2  %You can also do inv(y_1)*y_2
22
23
```

$$y_1 = 2x_1 + 4x_2 = 16$$
$$y_2 = 1x_1 + 4x_2 = 14$$

Command Window

```
y_1 =

     2     4
     1     4
```

$$y_1 = \begin{bmatrix} 2 & 4 \\ 1 & 4 \end{bmatrix}$$

```
y_2 =

    16
    14
```

$$y_2 = \begin{bmatrix} 16 \\ 14 \end{bmatrix}$$

```
x_value =

     2
     3
```

$$\text{x\_value} = \begin{bmatrix} 2 \\ 3 \end{bmatrix} \Rightarrow x_1 = 2\,, x_2 = 3$$

Exercise 4 – Plot equations

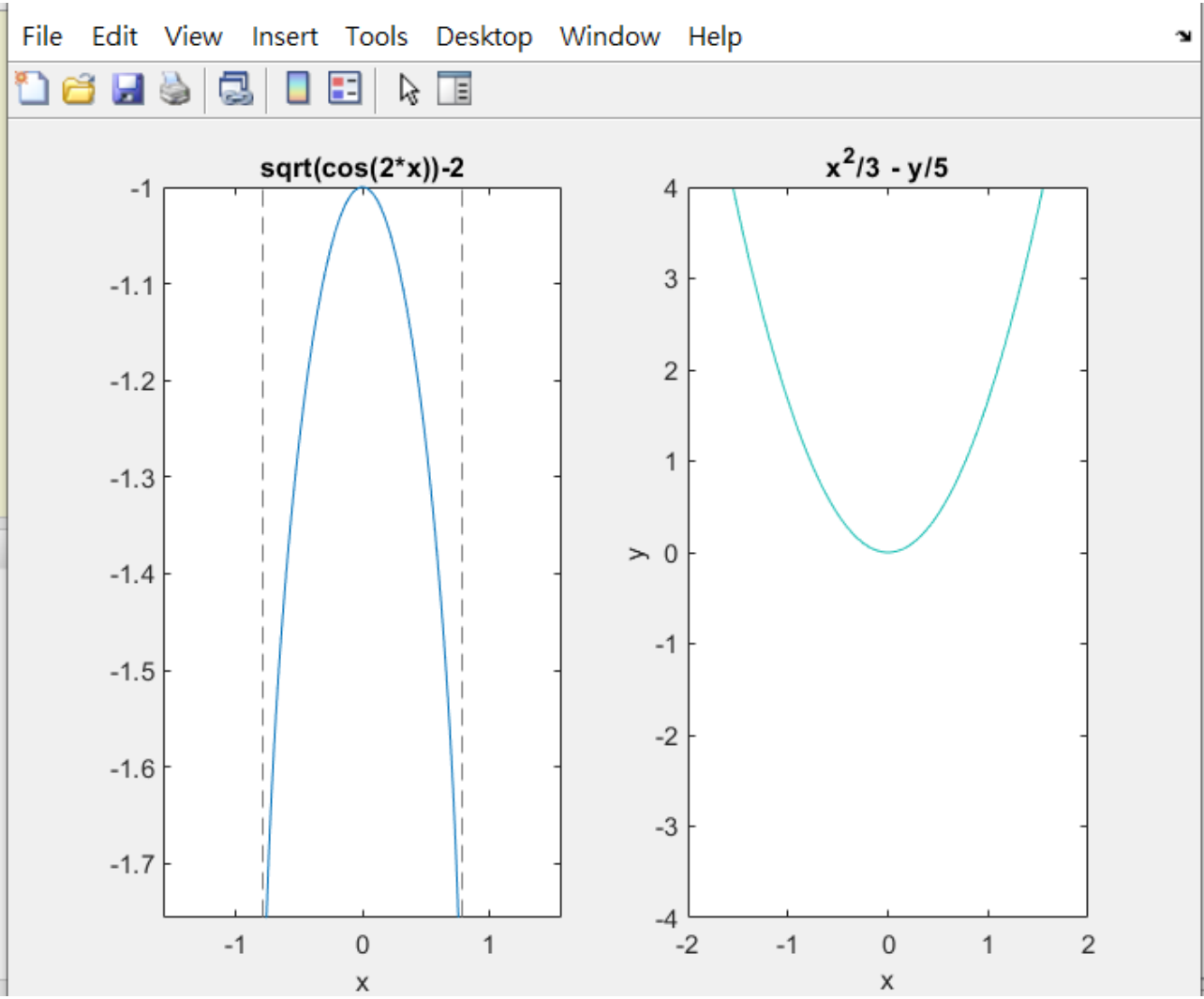
```
%%
%plot equations
subplot(1,2,1) % column:1 /row:2 /figure location: 1
fplot(@(x) sqrt(cos(2*x))-2,[-pi/2, pi/2])  %ezplot(fun2,[xymin,xymax])
title('sqrt(cos(2*x))-2');
xlabel('x');

subplot(1,2,2)  % column:1 /row:2 /figure location: 2
syms x y
ezplot((x.^2/3) - (y./5), [-2, 2, -4, 4]) %ezplot(fun,[xmin,xmax,ymin,ymax])
```

nd Window

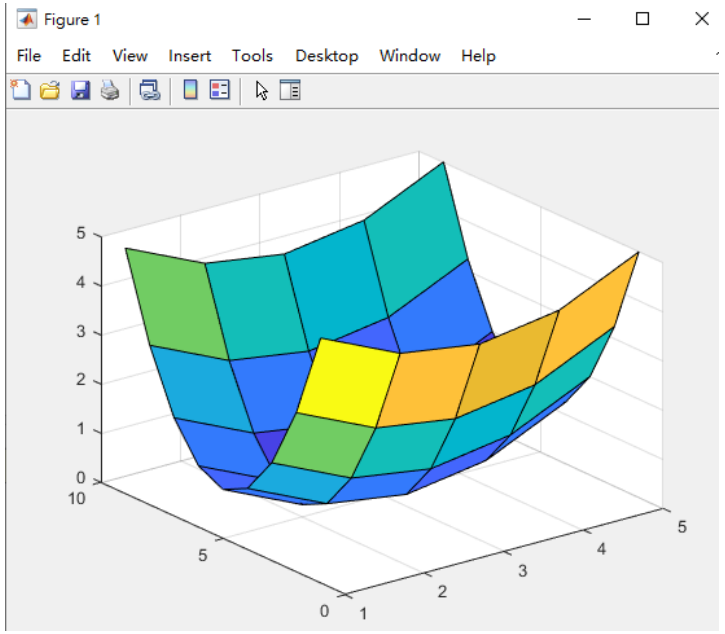
Eq1: $y = \sqrt{\cos(2x)} - 2\ ,\ x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$

Eq2: $\mathrm{f(x,y)} = \frac{x^2}{3} - \frac{y}{5}\ ,\ (-2 \le x \le 2, -4 \le y \le 4)$



Plot f(x,y)

- x =[-2:2] % value x range
- y =[-4:4] % value y range
- [xm ym] = meshgrid(x,y) % meshgrid: 2-D and 3-D grids
- fxy = (xm.^2)/4 + ((ym.^2)/4) % Your Function fxy =f(x,y)
- surf(fxy)   % surf : Surface plot



Reference

- https://www.tutorialspoint.com/matlab/index.htm