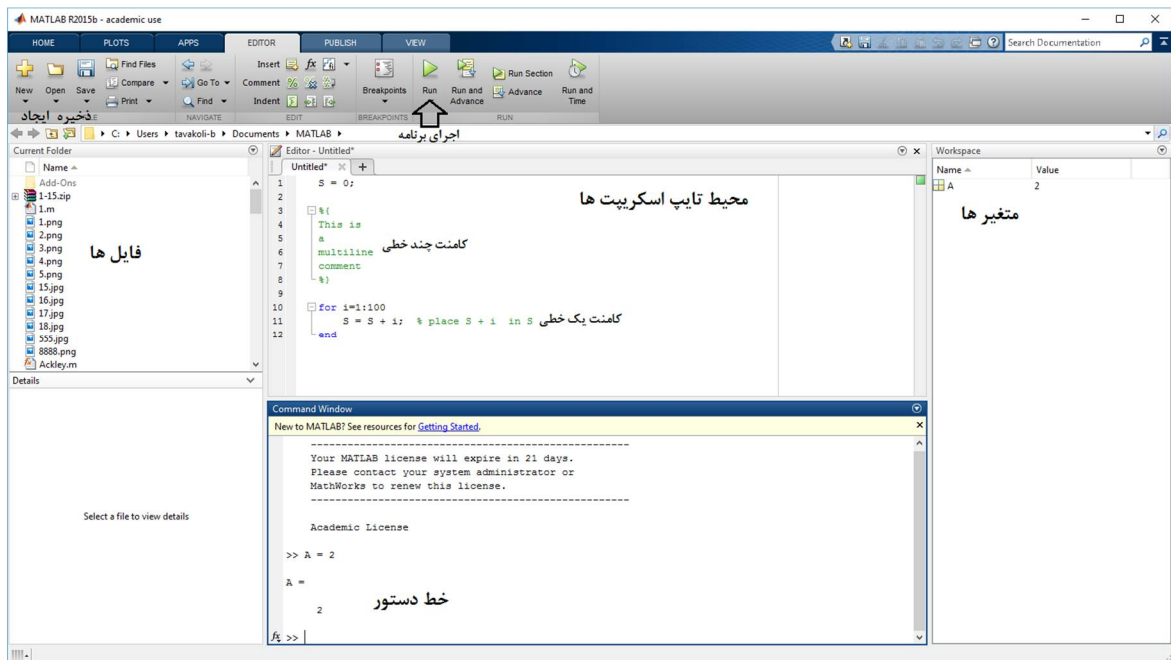


به نام خدا

جزوه درس برنامه‌نویسی

جلسه دوم

۱- آشنایی با محیط متلب



۲- دستورات ساده

+	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.
()	Parentheses; encloses function arguments and array indices; overrides precedence.
[]	Brackets; enclosures array elements.
.	Decimal point.
...	Ellipsis; line-continuation operator.
,	Comma; separates statements and elements in a row.
;	Semicolon; separates columns and suppresses display.
%	Percent sign; designates a comment and specifies formatting.
=	Assignment (replacement) operator.

Commands for Managing a Session	
<code>clc</code>	Clears Command window.
<code>clear</code>	Removes variables from memory.
<code>exist</code>	Checks for existence of file or variable.
<code>global</code>	Declares variables to be global.
<code>help</code>	Searches for a help topic.
<code>lookfor</code>	Searches help entries for a keyword.
<code>quit</code>	Stops MATLAB.
<code>who</code>	Lists current variables.
<code>whos</code>	Lists current variables (long display).

Basics:

`save 'file.mat'` save variables to *file.mat*
`load 'file.mat'` load variables from *file.mat*
`diary on` record input/output to file *diary*
`diary off` stop recording
`whos` list all variables currently defined
`clear` delete/undefine all variables
`help command` quick help on a given *command*
`doc command` extensive help on a given *command*

Defining/changing variables:

`x = 3` define variable *x* to be 3
`x = [1 2 3]` set *x* to the 1×3 row-vector (1,2,3)
`x = [1 2 3];` same, but don't echo *x* to output
`x = [1;2;3]` set *x* to the 3×1 column-vector (1,2,3)
`A = [1 2 3 4;5 6 7 8;9 10 11 12];`
 set *A* to the 3×4 matrix with rows 1,2,3,4 etc.
`x(2) = 7` change *x* from (1,2,3) to (1,7,3)
`A(2,1) = 0` change *A*_{2,1} from 5 to 0

Arithmetic and functions of numbers:

`3*4, 7+4, 2-6 8/3` multiply, add, subtract, and divide numbers
`3^7, 3^(8+2i)` compute 3 to the 7th power, or 3 to the 8+2*i* power
`sqrt(-5)` compute the square root of -5
`exp(12)` compute e^{12}
`log(3), log10(100)` compute the natural log (ln) and base-10 log (\log_{10})
`abs(-5)` compute the absolute value |-5|
`sin(5*pi/3)` compute the sine of $5\pi/3$

Arithmetic and functions of vectors and matrices:

$x * 3$ multiply every element of x by 3
 $x + 2$ add 2 to every element of x
 $x + y$ element-wise addition of two vectors x and y
 $A * y$ product of a matrix A and a vector y
 $A * B$ product of two matrices A and B
 $x * y$ not allowed if x and y are two column vectors!
 $x .* y$ element-wise product of vectors x and y
 A^3 the square matrix A to the 3rd power
 x^3 not allowed if x is not a square matrix!
 $x.^3$ every element of x is taken to the 3rd power
 $\cos(x)$ the cosine of every element of x
 $\text{abs}(A)$ the absolute value of every element of A
 $\exp(A)$ e to the power of every element of A
 $\text{sqrt}(A)$ the square root of every element of A
 $\text{expm}(A)$ the matrix exponential e^A
 $\text{sqrtm}(A)$ the matrix whose square is A

Transposes and dot products:

$x.', A.'$ the transposes of x and A
 x', A' the complex-conjugate of the transposes of x and A
 $x' * y$ the dot (inner) product of two *column* vectors x and y

Constructing a few simple matrices:

$\text{rand}(12,4)$ a 12×4 matrix with uniform random numbers in $[0,1)$
 $\text{randn}(12,4)$ a 12×4 matrix with Gaussian random (center 0, variance 1)
 $\text{zeros}(12,4)$ a 12×4 matrix of zeros
 $\text{ones}(12,4)$ a 12×4 matrix of ones
 $\text{eye}(5)$ a 5×5 identity matrix I ("eye")
 $\text{eye}(12,4)$ a 12×4 matrix whose first 4 rows are the 4×4 identity
 $\text{linspace}(1.2, 4.7, 100)$
row vector of 100 equally-spaced numbers from 1.2 to 4.7
 $7:15$ row vector of 7,8,9,...,14,15
 $\text{diag}(x)$ matrix whose diagonal is the entries of x (and other elements = 0)

Portions of matrices and vectors:

$x(2:12)$ the 2nd to the 12th elements of x
 $x(2:\text{end})$ the 2nd to the last elements of x
 $x(1:3:\text{end})$ every third element of x , from 1st to the last
 $x(:)$ all the elements of x
 $A(5,:)$ the row vector of every element in the 5th row of A
 $A(5,1:3)$ the row vector of the first 3 elements in the 5th row of A
 $A(:,2)$ the column vector of every element in the 2nd column of A
 $\text{diag}(A)$ column vector of the diagonal elements of A

Solving linear equations:

$A \setminus b$ for A a matrix and b a column vector, the solution x to $Ax=b$
 $\text{inv}(A)$ the inverse matrix A^{-1}