بسم الله الرحمن الرحيم

Special variables Value

ans. The default variable name used for results.

pi (π). The ratio of the circumferece of a circle to its diameter

eps ϵ

flops.

inf stands for infinity.

NaN or nan stands for Not-a-Number, 0/0

i and j $i=j=\sqrt{-1}$

nargin Number of function input arguments used.

بسم الله الرحمن الرحيم

realmin — The smallest usable positive real number.

realmax — The largest usable positive real number.

---

sqrt(-2)

Common Function

abs(x) — Absolute value or magnitude of complex number.

magnitude: The great size or importance of something

acos(x) — Inverse cosine

acosh(x) — Inverse hyperbolic cosine

angle(x) — Four-quadrant angle of complex

asin(x) — Inverse sine

cosh(x) — hyperbolic cosine $\left[\cosh(x) = \frac{1}{2}(e^{u} + e^{-u})\right]$

$\left[\sinh(x) = \frac{1}{2}(e^{u} - e^{-u})\right]$

exp(x) — Exponential: e^{x}.

بسم الله الرحمن الرحيم.

fix (x)	Round toward zero
floor(x)	Round toward minus infinity
gcd(x,y)	Greatest common divisor of integers x and y
imag(x)	Complex imaginary part
lcm(x,y)	Least common multiple
log (x)	Natural logarithm
log10 (x)	Common logarithm
real (x)	complex real part
rem(x,y)	Remainder after division rem(x,y) gives the remainder of x/y

round(x) Round toward nearest integer.

sign(x) Signum function: return sign of argument, e.g.,
sign(1.2) = 1, sign(-23.4) = -1,
sign(0) = 0

sin(x) Sine.

sqrt(x) square root

tan(x) Tangent

tanh(x) Hyperbolic tangent

Note| The data and variables created in the Command window reside in what is called the MATLAB workspace.

بسم الله الرحمن الرحيم.

Matlab:

$$e = \lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^n$$

$$e = 2.71828\ 1828\ 459\ldots$$

```
Sin

sind(90)

sind(0)
```

Comments

MATLAB treats everything after % as a comment. It helps a reader to

بسم الله الرحمن الرحيم.

Ceil (x). returns the smallest integer greater than or equal to x

isprime(n) returns true if n is prime.

>> isprime(3)
ans
1

>> isprime(4)
ans
0.

factor(k) returns prime factors of k.

>> factor(6)
ans
2 3.

>> factor(16)
ans
2 2 2 2

Matlab layout of the MatLab windows.

1. Workspace
2. Current Folder
3. Figure
4. Editor Window
5. Command Window.

By entering commands in the Matlab Command Window

MatLab is a high-level technical computing language and interactive environment for algorithm development, data analysis, and numerical computation.

---

(1) An input commands to MatLab in the command window.

(2) MatLab returns out-put in two ways; typically, text or numerical output is returned in the same Command Window, but graphical output appears in a separate figure window

---

(3) MatLab assigns a new value to ans with each calculat

(1) A MatLab Desktop window contain (10)
a title bar, menu bar, tool bar and four embedded window: the command window, the command History window, the current Directory Browser, and Workspace Browser.

(2) >> : Command prompt (أمر الأوامر)

(3) Note: If the command Window is active, its title bar will be dark, and the prompt will followed by cursor. [a blinking vertical line].

Example >> factor(9)
ans = 3 3

(4) Example H.W >> factor(.123456789)
ans =

(5) Matlab Windows 3 3 3607 3803

(6) Syms : It use to

is available via the MATLAB

Example

```
>> ans^2 + sqrt(ans)

ans =

   510.9934.
```

Note ① MatLab assigns a new value to ans with each calculation.

② We can assign computed values to variable of your choosing.

Example

```
>> V = sin(10)

V =

   -0.5440
```

```
>> cos(10)

ans

   -0.8391
```

Note Trigonometric function in MatLab use radians, not degrees.

Notes) ① MatLab displays only 5 digits by default. 10/F/2022

① To display more digits, type format long. Then all subsequent numerical output will have 15 digits.

② Type format short to return to 5-digit

Incidentally purchased

Notes) ① We can edit an input line by using the up-Arrow key to redisplay the previous command.

② Editing the command using the left-right arrow keys.

(3) The syms x is equivalent to
x = sym('x'). الحمد لله رب العالمين

Note To add 1/2 and 1/3 symbolically:

```
>> sym('1/2')+sym('1/3')
ans =
   5/6
```

Note

Vpa = variable-precision (دقة) arthmetic.

Example: to print 7 digits of $\sqrt{2}$ type

```
>> vpa('sqrt(2)', 7)
ans
1.41421
```

---

we can correct, modify, or reenter a previous command.

---

foolproof
لايمكن استخدامه
بسوء.

abort

---

foolproof = infailible.

---

perform = نفذ
do = implement = execute.

Remark: vpa can not use with the expressions.

```
>> vpa('3^45')
```

Vectors and Matrix

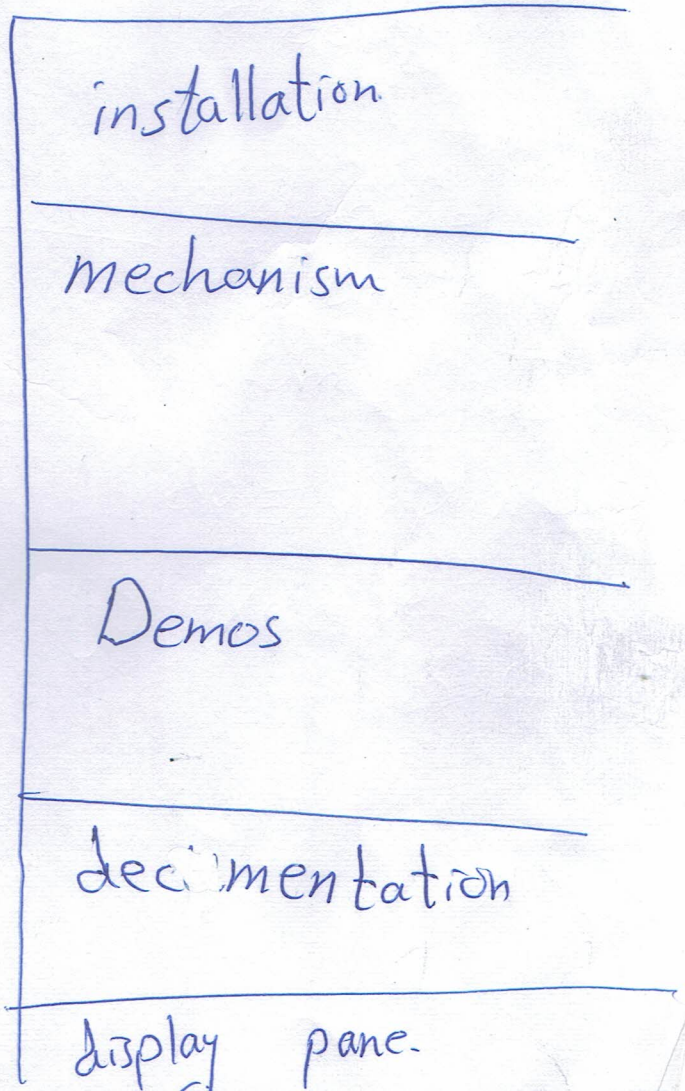
- Vectors: a vector is an ordered list of numbers, separated by commas and or spaces, inside square brackets.

Example:

```
>> Z=[2,4,6,8] ↵

Z =
     2     4     6     8
```

Note: The simplest way to conclude a MatLab session is to type quit at the prompt.



بسم الله الرحمن الرحيم

Example

```
>>Ceil(900.8)

ans=

   901

>> ceil(1.1)

ans=

   2
```

pane

egine locates

Note| subs command is used to substitute a numerical value.

Example|

```
>> d=1, syms u v.

d=

   1

>> w=u^2-v^2

w

  u^2-v^2.

>> subs(w,d,2)

ans.
```

بسم الله الرحمن الرحيم.

```
>>subs (w, v, d)

  ans

  u^2-1
```

```
>>subs (w, v, u+v)
  ans
  u^2-(u+v)^2
>> simplify (ans)
  ans
  -2*u*v-v^2
```

Notes ① When you enter multiple commands on a single line separated by commas.

② MatLab evaluates each command and displays the output on separate lines.

Note Floating-point format

6.1232e-17

≡

6.1232×10^{-17}.

---

① In MatLab, pi gives an approximation to π accurate to about 15 digits, not its exact value.

---

② The notation 1:9 is used to represent a vector of numbers running from 1 to 9.

```
>> X=[1,2,3,7,9,12]

>> X(1)
ans=
   1
```