繪圖軟體應用 第2周

Matlab應用領域

1. 平行運算
2. 數學、統計、最佳化
3. 物理模式

```
clear;clc
3+2
```

```
ans = 5
```

```
mat = magic(3);
help           % HELP topics
```

```
New to MATLAB? See resources for Getting Started.

To view the documentation, open the Help browser.
```

```
help graph2d   % Two dimensional graphs.
```

```
  Two dimensional graphs.

  Elementary X-Y graphs.
    plot      - Linear plot.
    loglog    - Log-log scale plot.
    semilogx  - Semi-log scale plot.
    semilogy  - Semi-log scale plot.
    polar     - Polar coordinate plot.
    plotyy    - Graphs with y tick labels on the left and right.

  Axis control.
    axis       - Control axis scaling and appearance.
    zoom       - Zoom in and out on a 2-D plot.
    grid       - Grid lines.
    box        - Axis box.
    rbbox      - Rubberband box.
    hold       - Hold current graph.
    axes       - Create axes in arbitrary positions.
    subplot    - Create axes in tiled positions.

  Graph annotation.
    plotedit  - Tools for editing and annotating plots.
    title     - Graph title.
    xlabel    - X-axis label.
    ylabel    - Y-axis label.
    texlabel  - Produces the TeX format from a character string.
    text      - Text annotation.
    gtext     - Place text with mouse.

  Hardcopy and printing.
    print      - Print graph or Simulink system; or save graph to MATLAB file.
    printopt   - Printer defaults.
    orient     - Set paper orientation.

  See also graph3d, specgraph.
```

```
doc fft         % 找和 fft 相關的指令
who
```

```
Your variables are:

ans  mat
```

```
clc
c = 5+3
```

```
c = 8
```

```
whos      %一個變數值以 8 個 bytes 儲存
```

```
  Name      Size            Bytes  Class     Attributes

  ans       1x1                 8  double
  c         1x1                 8  double
  mat       3x3                72  double
```

永久常數

```
c1 = i
```

```
c1 = 0.0000 + 1.0000i
```

```
c2 = j
```

```
c2 = 0.0000 + 1.0000i
```

```
NaN       % 不存在的數 (繪圖常用到)
```

```
ans = NaN
```

```
realmax  % 系統所能表示的最大實數
```

```
ans = 1.7977e+308
```

```
realmin  % 系統所能表示的最小實數
```

```
ans = 2.2251e-308
```

三角函數

```
a1 = sin(90)   %徑度
```

```
a1 = 0.8940
```

```
a2 = sin(pi/2)
```

```
a2 = 1
```

```
a3 = sind(90)  %弧度
```

```
a3 = 1
```

```
a4 = asin(1)   %反三角函數(徑度)
```

```
a4 = 1.5708
```

```
                % pi/2
```

雙曲線函數

```
a5 = sinh(90)
```

```
a5 = 6.1020e+38
```

指數與複數的計算

```
g = nthroot(27,3)
```

```
g = 3
```

```
g2 = log(16)/log(12)
```

```
g2 = 1.1158
```

```
b1 = 3+5i
```

```
b1 = 3.0000 + 5.0000i
```

```
abs(b1) %絕對值
```

```
ans = 5.8310
```

```
        %求出複數 b1 到原點的距離
angle(b1) %計算 b1 的幅角(徑度)
```

```
ans = 1.0304
```

```
b2 = complex(3,5)
```

```
b2 = 3.0000 + 5.0000i
```

```
b3 = conj(b1) % 共軛複數
```

```
b3 = 3.0000 - 5.0000i
```

```
b4 = imag(b1) % 虛部
```

```
b4 = 5
```

```
b5 = real(b1) % 實部
```

```
b5 = 3
```

factor v.s primes

```
d1 = factor(15) %找出 15 的所有質因數
```

```
d1 = 1×2
```

```
     3     5
```

```
d2 = primes(15) %小於等於 15 的所有質數
```

```
d2 = 1×6
     2     3     5     7    11    13
```

陣列

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

```
v1 = 1×4
     1     2     3     4
```

```
v1(2) = []      %把某個元素刪除，使用空矩陣
```

```
v1 = 1×3
     1     3     4
```

```
e1 = 1:10
```

```
e1 = 1×10
     1     2     3     4     5     6     7     8     9    10
```

```
e2 = 1:4:10     %最後一個元素落點不一定在終止值
```

```
e2 = 1×3
     1     5     9
```

```
linspace(1,10) %建立一個位在1到10，具有100個元素的列向量
```

```
ans = 1×100
    1.0000    1.0909    1.1818    1.2727    1.3636    1.4545    1.5455    1.6364 ···
```

```
linspace(1,10,11) %建立一個位在1到10，具有11個元素的列向量
```

```
ans = 1×11
    1.0000    1.9000    2.8000    3.7000    4.6000    5.5000    6.4000    7.3000 ···
```

```
x = -2*pi:0.2:2*pi;
```

向量處理函數

```
e3 = prod(v1) %product(乘積)
```

```
e3 = 12
```

```
e4 = sort(v1,'descend') %降冪排序
```

```
e4 = 1×3
     4     3     1
```

```
e5 = cumsum(v1) %累加
```

```
e5 = 1×3
     1     4     8
```

```
e6 = cumprod(v1) %累乘
```

```
e6 = 1×3
     1     3    12
```

```
[val,ind] = sort(v1)
```

```
val = 1×3
     1     3     4
ind = 1×3
     1     2     3
```

```
[~,ind] = sort(v1)  %只回傳位置資訊
```

```
ind = 1×3
     1     2     3
```

```

```