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Pemrograman Komputer

Sintak MATLAB (2)

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Refreshing..

```
>> calendar(year,month) % default is current year and month

>> now        % number of days since hypothetical January 1, 0000

>> clock   % numerical row vector [ YYYY MM DD HH MM SS ]

>> date    % string representation of date ['DD-<Month>-YYYY`]

>> weekday(now) % current day of the week, Sun = 1
```

Plotting

- x = -2:1/10:2
- y = x.^2
- plot(x,y) % plots the parabola y=x^2 for x from -2 to 2
- z = x+i*y % complex vector
- plot(z) % plots same parabola

- t = 0:pi/32:2*pi;
- x = cos(t); y = sin(t);
- plot(x,y)

- r = sqrt(x.^2+y.^2);
- polar(t,r)

Bilangan COmplex

- >> x = 3 - 5i
- >> real(x)
- >> imag(x)
- >> conj(x)
- Abs(x)
- Angle(x)

Roots

- Notasi polinomial adalah koefisien dari vektor
  - Contoh: **>> p = [1 0 -4]**
    - Merupakan fungsi (**1**.*x² + **0**.*x¹ + (**-4**).*x⁰) -- i.e., $x^2 - 4$

  - *Akar akar yang ada*
    - **>> q = roots(p)**

  - Polynomial dapat dibangun dari akar akarnya
    - **>> r = poly(q)**
- *roots* merupakan kebalikan dari *poly*

Diferensial dan Integrasi

- Integrasi
  Syntax: quad('**function_name**', **lower**, **upper**)
  - Contoh :
    ```
    >>area = quad('x.^2 - 6.*x  + 5', 1, 5)
      area =
            -10.6667
    ```
  - Contoh lain (non polinomial)
    ```
    >>area = quad('sin',0,pi)
        area =
              1.99999999619084
    ```

Diferensial dan Integrasi

- Diferensial
- Syntax: `[x,y] = solver(@yprime, [xfirst  xlast], y0, {options})`

  - *x* is the independent variable   **(generated by the solver)**
  - *y* is the dependent variable solution **(computed by the solver)**
  - *yprime* is a function describing *dy/dx* **(in external file _yprime.m_)**
  - *[xfirst xlast]* identifies the range of *x*
  - *yo* is a vector of initial values for *y*   **(*y* values for xfirst)**
  - *{options}* can be arguments such as accuracy tolerance

Function

- x=[3 9 5 4 7 2 8]
- max(x), [m,n]=max(x)
- min(x), [m,n]=min(x)
- sum(x)
- mean(x)
- sort(x)

Function

- x=[2 11 0 10 5;6 14 12 11 9;13 9 14 11 2]
- max(x), [m,n]=max(x)
- min(x), [m,n]=min(x)
- sum(x)
  sum(x,n), n is the number of dimension
- mean(x)
  mean(x,n), n is the number of dimension

Matriks

- Terdapat tiga jenis format data di MATLAB, yaitu skalar, vektor, dan matriks.
  - **Skalar, ialah suatu bilangan tunggal**
  - **Vektor, ialah sekelompok bilangan yang tersusun 1-dimensi.**
  - **Matriks,** sekelompok bilangan yang tersusun dalam segi-empat 2-dimensi.

Introduction of Matrix

- s = [1 3 5 2];
- s = [1, 3, 5, 2];

1	3	5	2

- s = [1 2 3 4 ; 5 6 7 8 ; 9 10 11 12]

1	2	3	4
5	6	7	8
9	10	11	12

Introduction of Matrix

- s = [1 3 5 2];
- t = 2*s+1

```
Command Window
>> s = [1 3 5 2];
t = 2*s+1


t =

       3       7      11       5
```

Introduction of Matrix

- **s = [1 2 3 4 ; 5 6 7 8 ; 9 10 11 12]**

```
Command Window
>> s = [1 2 3 4 ; 5 6 7 8 ; 9 10 11 12]

s =

     1     2     3     4
     5     6     7     8
     9    10    11    12
```

S(1,1)	S(1,2)	S(1,3)	S(1,4) or S(1,end)
S(2,1)	S(2,2)	S(2,3)	S(2,4) or S(2,end)
S(3,1) or S(end,1)	S(3,2) or S(end,2)	S(3,3) or S(end,3)	S(3,4) or S(end,end)

Introduction of Matrix

```
Command Window
>> s = [1 2 3 4 ; 5 6 7 8 ; 9 10 11 12]

s =

     1     2     3     4
     5     6     7     8
     9    10    11    12
```

```
>> s(1,2)

ans =

     2

>> s(3,4)

ans =

    12

>> s(2,3)

ans =

     7
```

Introduction of Matrix

- A=[1 2 3 4]
- B=[5 6 7 8]
- C=B'

```
Command Window
  >> A=[1 2 3 4]

  A =

       1     2     3     4

  >> B=[5 6 7 8]

  B =

       5     6     7     8
```

```
  >> C=B'

  C =

       5
       6
       7
       8
```

Introduction of Matrix

- A*B.......error

```
Command Window
  >> A*B
  ??? Error using ==> mtimes
  Inner matrix dimensions must agree.
```

- A.*B

```
Command Window
  >> A.*B

  ans =

       5    12    21    32
```

9

Introduction of Matrix

- A*C

```
        ┌───┐
        │ 5 │
┌───┬───┬───┬───┐  ┌───┐
│ 1 │ 2 │ 3 │ 4 │  *│ 6 │
└───┴───┴───┴───┘  │ 7 │
                   │ 8 │
                   └───┘
```

- C*A

```
┌───┐
│ 5 │
│ 6 │     ┌───┬───┬───┬───┐
│ 7 │  *  │ 1 │ 2 │ 3 │ 4 │
│ 8 │     └───┴───┴───┴───┘
└───┘
```

```
Command Window
>> A*C

ans =

    70

>> C*A

ans =

     5    10    15    20
     6    12    18    24
     7    14    21    28
     8    16    24    32
```

Matriks Khusus

- **ones(n)** membuat matriks satuan (semua elemennya berisi angka 1) berukuran n×n.

- **ones(m,n)** membuat matriks satuan berukuran m×n.

- **zeros(n)** membuat matriks nol (semua elemennya berisi
- angka 0) berukuran n×n.

- **zeros(m,n)** membuat matriks nol berukuran m×n.

- **eye(n)** membuat matriks identitas berukuran n×n (semua elemen diagonal bernilai 1, sementara lainnya bernilai 0)

Matriks Khusus

- **rand(n), rand(m,n)** membuat matriks n×n, atau m×n, berisi bilangan random terdistribusi uniform pada selang 0 s.d. 1.

- **randn(n), randn(m,n)** membuat matriks n×n, atau m×n, berisi bilangan random terdistribusi normal dengan mean = 0 dan varians = 1. *Command ini kerap kita gunakan* untuk membangkitkan derau putih gaussian.

- **[]** matriks kosong, atau dengan kata lain matriks 0×0; biasa digunakan untuk mendefinisikan variabel yang belum diketahui ukurannya.

Introduction of Matrix

- A=[1 2 3 4;5 6 7 8;9 10 11 12]
- B=[A;13 14 15 16]
- C=A(:,2)
  ":" means All

```
Command Window
>> A=[1 2 3 4;5 6 7 8;9 10 11 12]

A =

     1     2     3     4
     5     6     7     8
     9    10    11    12

>> B=[A;13 14 15 16]

B =

     1     2     3     4
     5     6     7     8
     9    10    11    12
    13    14    15    16

>> C=A(:,2)

C =

     2
     6
    10
```

Introduction of Matrix

- D=A([1 3],:)
  Select the row 1 & 3

- E=A(:,[2 4])
  Select the column 2 & 4

```
Command Window
>> A=[1 2 3 4;5 6 7 8;9 10 11 12]

A =

     1     2     3     4
     5     6     7     8
     9    10    11    12

>> D=A([1 3],:)

D =

     1     2     3     4
     9    10    11    12

>> E=A(:,[2 4])

E =

     2     4
     6     8
    10    12
```

Introduction of Matrix

- "[]" means ϕ
- A(:,3)=[]

```
Command Window
>> A

A =

     1     2     3     4
     5     6     7     8
     9    10    11    12

>> A(:,3)=[]

A =

     1     2     4
     5     6     8
     9    10    12
```

Introduction of Matrix

Command Window

```
>> A=magic(5)

A =

    17    24     1     8    15
    23     5     7    14    16
     4     6    13    20    22
    10    12    19    21     3
    11    18    25     2     9
```

- A=magic(5)
- B=A(:,1:3)
- C=A(2:4,[1 4 5])

```
>> B=A(:,1:3)

B =

    17    24     1
    23     5     7
     4     6    13
    10    12    19
    11    18    25
```

```
>> C=A(2:4,[1 4 5])

C =

    23    14    16
     4    20    22
    10    21     3
```

Introduction of Matrix

Command Window

- a=zeros(4,4,3)
- a(:,:,1)=1
- a(:,:,2)=5
- a(:,:,3)=7

```
>> a=zeros(4,4,3)

a(:,:,1) =

     0     0     0     0
     0     0     0     0
     0     0     0     0
     0     0     0     0


a(:,:,2) =

     0     0     0     0
     0     0     0     0
     0     0     0     0
     0     0     0     0


a(:,:,3) =

     0     0     0     0
     0     0     0     0
     0     0     0     0
     0     0     0     0
```

```
a(:,:,1) =

     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1


a(:,:,2) =

     5     5     5     5
     5     5     5     5
     5     5     5     5
     5     5     5     5


a(:,:,3) =

     7     7     7     7
     7     7     7     7
     7     7     7     7
     7     7     7     7
```