

PRAKTIKUM METODE NUMERIK PERTEMUAN 1

Perkenalan MATLAB



Install MATLAB


Segera install dulu bagi yang belum.

Kalau sudah, nyantai dulu 😊

Untuk versi MATLAB bebas.



SEKARANG SAATNYA NGODING PAKAI MATLAB



Ngoding MATLAB itu mudah lo. Tidak seperti ngoding C, Java, PHP, dll.

So, jangan bosan ya hehe...

VARIABEL

```
>> a = 3;  
>> b = 7  
>> c = a + b;  
>> c + b
```

```
>> a = 3;  
>> b = 7  
  
b =  
  
7  
  
>> c = a+b;  
>> c = a+b  
  
c =  
  
10  
  
>> a+b  
  
ans =  
  
10
```

OPERASI

Penjumlahan :

```
>> a = 6;
```

```
>> b = 9;
```

```
>> c = a + b;
```

Pengurangan :

```
>> x = 9;
```

```
>> y = 4;
```

```
>> z = x - y;
```

```
>> a = 6;  
>> b = 9;  
>> c = a+b
```

```
c =
```

```
15
```

```
>> x = 9;  
>> y = 4;  
>> z = x-y
```

```
z =
```

```
5
```

OPERASI

Perkalian :

```
>> a = 5;
```

```
>> b = 10;
```

```
>> c = a*b;
```

Pembagian :

```
>> x = 24;
```

```
>> y = 36;
```

```
>> x/y;
```

```
>> x\y;
```

```
>> a = 5;  
>> b = 10;  
>> c = a*b
```

```
c =
```

```
50
```

```
>> x = 24;  
>> y = 36;  
>> x/y
```

```
ans =
```

```
0.6667
```

```
>> x\y
```

```
ans =
```

```
1.5000
```

ARRAY MATRIKS

```
>> a = [1 2 3]
>> b = [1 2 3; 4 5 6]
>> c = [5 6; 4 3; 2 9]
>> d = [4; 5; 6]
```

```
>> d = [4; 5; 6]
```

```
d =
```

```
4
5
6
```

```
>> a = [1 2 3]
```

```
a =
```

```
1    2    3
```

```
>> b = [1 2 3; 4 5 6]
```

```
b =
```

```
1    2    3
4    5    6
```

```
>> c = [5 6; 4 3; 2 9]
```

```
c =
```

```
5    6
4    3
2    9
```

OPERASI MATRIKS

```
>> a = [2 3 4 5; 1 2 3 4; 7 6 5 4]
```

```
>> x = [1 3];
```

```
>> b = a(x,2)
```

```
>> c = a(2,x)
```

```
>> a = [2 3 4 5; 1 2 3 4; 7 6 5 4]
```

```
a =
```

2	3	4	5
1	2	3	4
7	6	5	4

```
>> x = [1 3];
```

```
>> b = a(x,2)
```

```
b =
```

3
6

```
>> c = a(2,x)
```

```
c =
```

1	3
---	---

OPERASI MATRIKS

```
>> d = a(x,:)
```

```
>> e = a(:,x)
```

```
>> f = zeros(4)
```

```
>> f(1:2, :) = a(x, :)
```

```
>> g = ones(3)
```

```
>> g(1:2, 2:3) = a(2:3, 3:4)
```

```
>> d = a(x,:)
```

d =

2	3	4	5
7	6	5	4

```
>> e = a(:,x)
```

e =

2	4
1	3
7	5

```
>> f = zeros(4)
```

f =

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

```
>> f(1:2, :) = a(x, :)
```

f =

2	3	4	5
7	6	5	4
0	0	0	0
0	0	0	0

```
>> g = ones(3)
```

g =

1	1	1
1	1	1
1	1	1

```
>> g(1:2, 2:3) = a(2:3, 3:4)
```

g =

1	3	4
1	5	4
1	1	1

OPERASI MATRIKS

```
>> h = rand(3,4)
```

```
>> h(:,3) = a(:,1)
```

```
>> h = rand(3,4)
```

```
h =
```

0.8147	0.9134	0.2785	0.9649
0.9058	0.6324	0.5469	0.1576
0.1270	0.0975	0.9575	0.9706

```
>> h(:,3) = a(:,1)
```

```
h =
```

0.8147	0.9134	2.0000	0.9649
0.9058	0.6324	1.0000	0.1576
0.1270	0.0975	7.0000	0.9706

Dalam Operasi Matriks, ada 3 operasi spesifikasi matriks :

1. Zeros
2. Ones
3. Random

OPERASI MATRIKS

```
x = [4 5 6; 6 7 8; 8 9 0];  
y = [1 2 3; 6 5 4; 7 9 1];  
z = x*y  
a = x.*y  
b = x.^y  
c = det(x)  
d = inv(y)
```



INPUT OUTPUT

Dalam MATLAB dapat menginput data dengan menggunakan fungsi :

input('...');

Untuk outputnya dapat menggunakan dua fungsi

disp();

fprintf('...',[variabel])

INPUT OUTPUT

InputOutput.m



```
- x = input('Masukan angka : ');  
- fprintf('Anda telah menginput angka ');  
- disp(x);
```

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> InputOutput  
Masukan angka : 3  
Anda telah menginput angka      3
```



DECISION

Dalam MATLAB mengenal fungsi *if else* dan *switch*.

Misalkan :

Program IPK

Program Konversi Suhu



DECISION

Program IPK

```
x = input ('Masukan nilai IP : ');  
if (x > 85)  
    fprintf ('Anda dapat A\n');  
elseif (x >= 80 & x < 85)  
    fprintf ('Anda dapat A-\n');  
elseif (x >= 75 & x < 80)  
    fprintf ('Anda dapat B+\n');  
elseif (x >= 70 & x < 75)  
    fprintf ('Anda dapat B\n');  
elseif (x >= 65 & x < 70)  
    fprintf ('Anda dapat C+\n');  
else  
    fprintf ('Anda dapat C\n');  
end
```

DECISION

Program Konversi Suhu

```
x = input('Masukan nilai suhu Celcius : ');
if (x > 100)
    fprintf('Maaf, batas titik didih Celcius 100 derajat Celcius\n');
elseif (x < 0)
    fprintf('Maaf, batas titik beku Celcius 0 derajat Celcius\n');
else
    y = input('Tentukan konversi suhu : ');
    switch (y)
        case 1
            x = 0.8*x;
            fprintf('Sukses konversi ke Reamur. Maka nilai R : %g\n', x);
        case 2
            x = 1.8*x + 32;
            fprintf('Sukses konversi ke Fahrenheit. Maka nilai F : %g\n', x);
        case 3
            x = x + 273;
            fprintf('Sukses konversi ke Kelvin. Maka nilai K : %g\n', x);
        otherwise
            fprintf('Pilihan Anda tidak ada dalam sistem ini');
    end
end
end
```


LOOPING

Dalam MATLAB mengenal *for* dan *while* do

```
% Looping for kondisi 1
- for i = 1:5
    p = i^2
end

% Looping for kondisi 2
- for j = 1:0.5:5
    q = j/2
end
```

```
p = 0;
- while (p <= 10)
    q = p^2 + p
    p = p + 1;
end
```

DIFFERENSIAL

```
f = input('Masukan bentuk persamaan f(x) = ');  
f_asli = sym (f)  
f_turunan = diff(f_asli, 'x')
```

```
>> syms x
```

```
>> Differensial
```

```
Masukan bentuk persamaan f(x) = x.^2 + 3*x + 4
```

```
f_asli =
```

```
x^2 + 3*x + 4
```

```
f_turunan =
```

```
2*x + 3
```

INTEGRAL

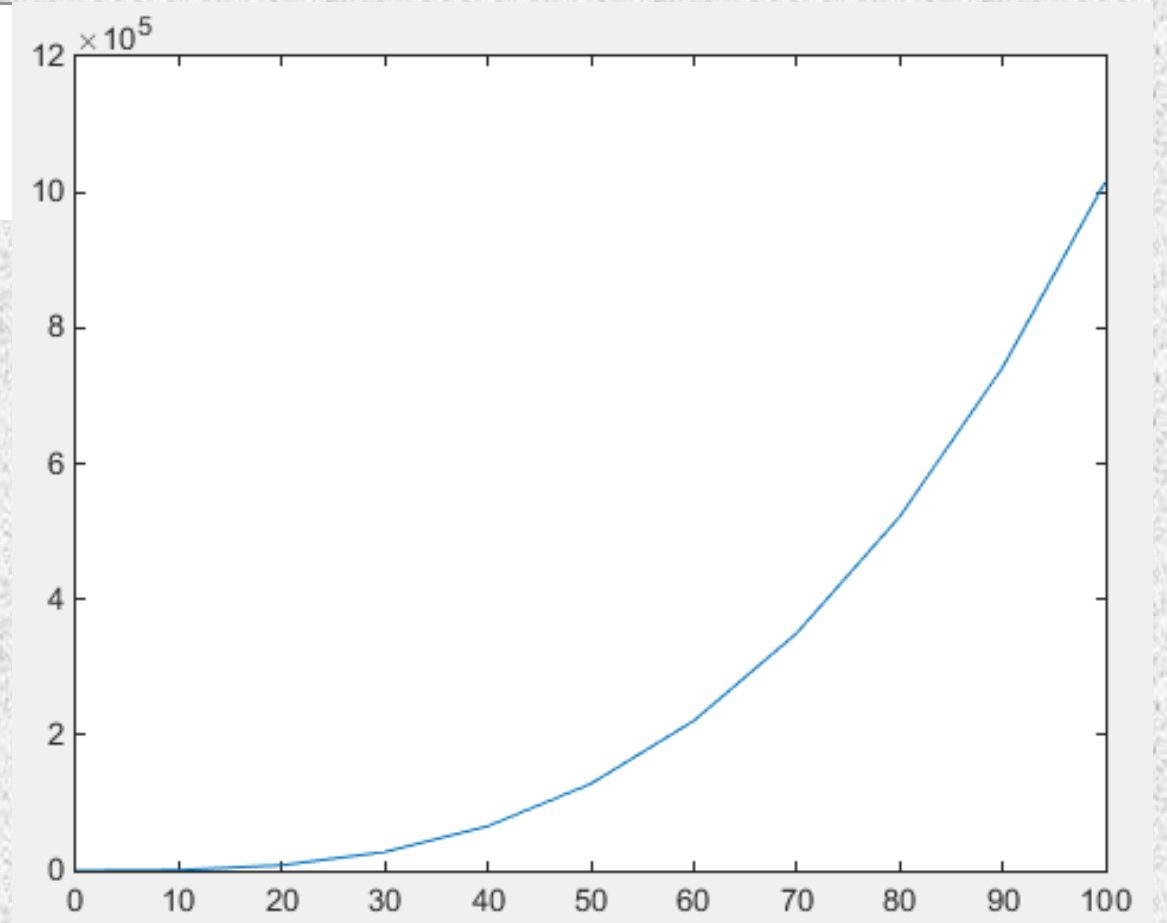
```
f = input ('Fungsi : ');  
f_asli = sym(f)  
f_integral = int(f_asli, 'x')
```

```
>> syms x  
>> Integral  
Fungsi : sin(3*x) - 2*x.^3  
  
f_asli =  
  
sin(3*x) - 2*x^3  
  
f_integral =  
  
- cos(3*x)/3 - x^4/2
```

GRAFIK

Grafik Garis 2D

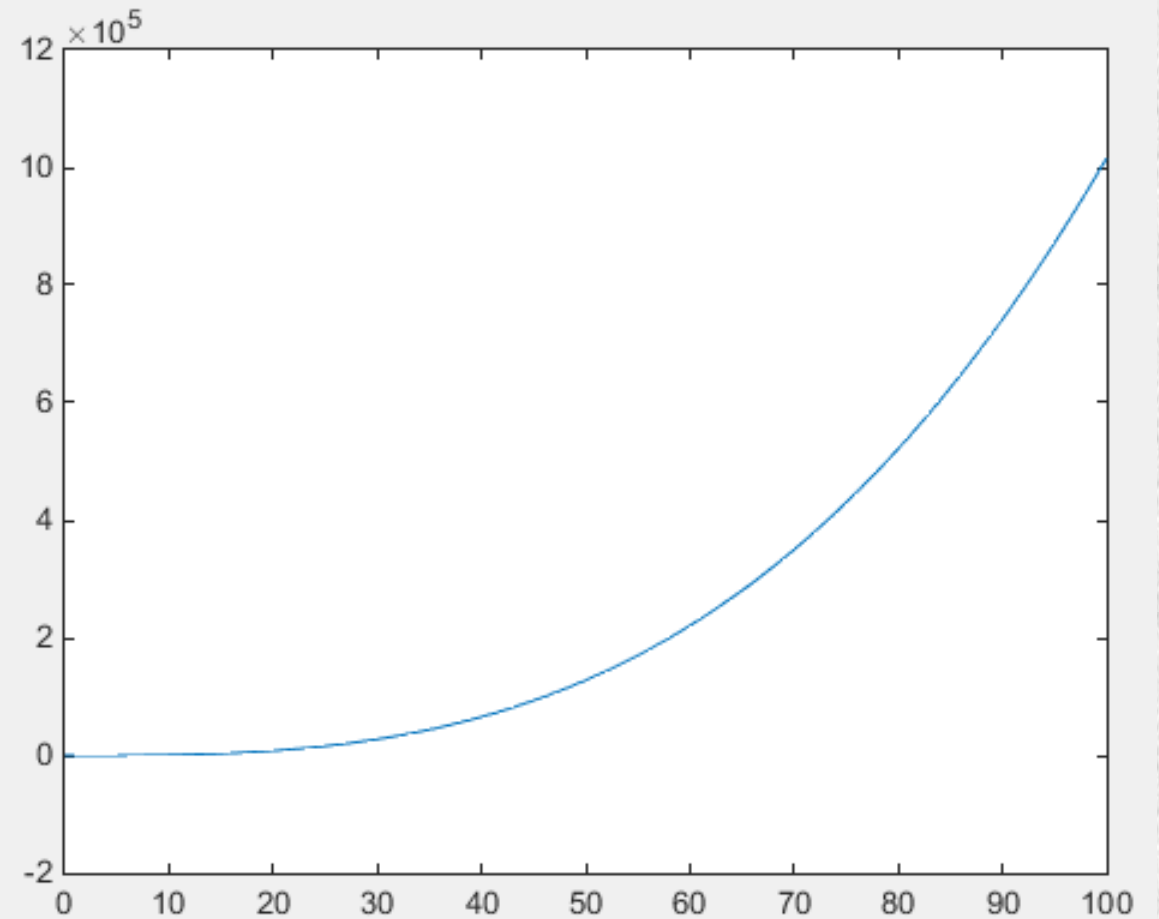
```
x = 0:10:100;  
y = x.^3 + 2*x.^2 - 40*x;  
plot(x,y);
```



GRAFIK

Grafik Garis 2D

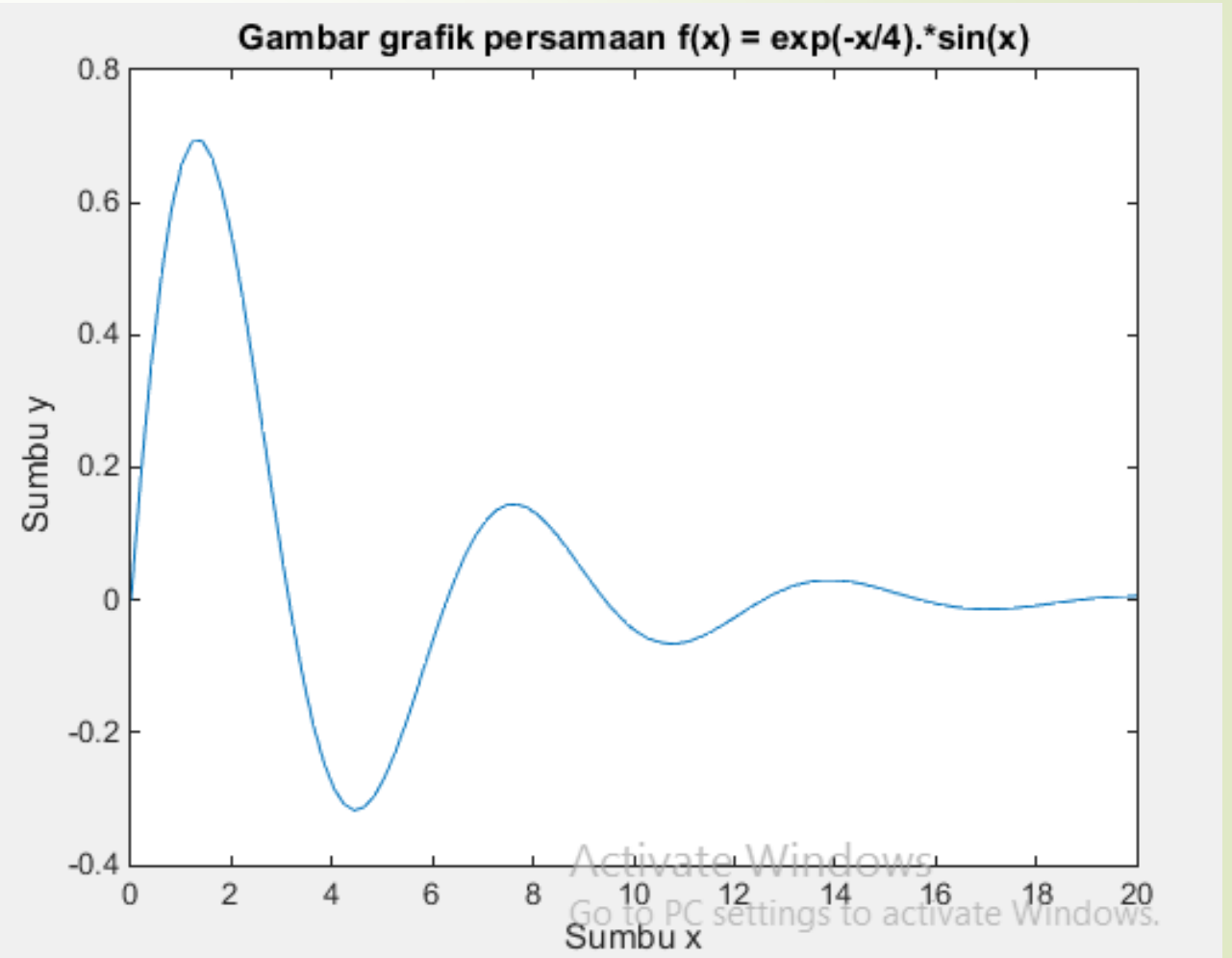
```
x = 0:1:100;  
y = x.^3 + 2*x.^2 - 40*x;  
plot(x,y);
```



GRAFIK

Grafik Garis 2D

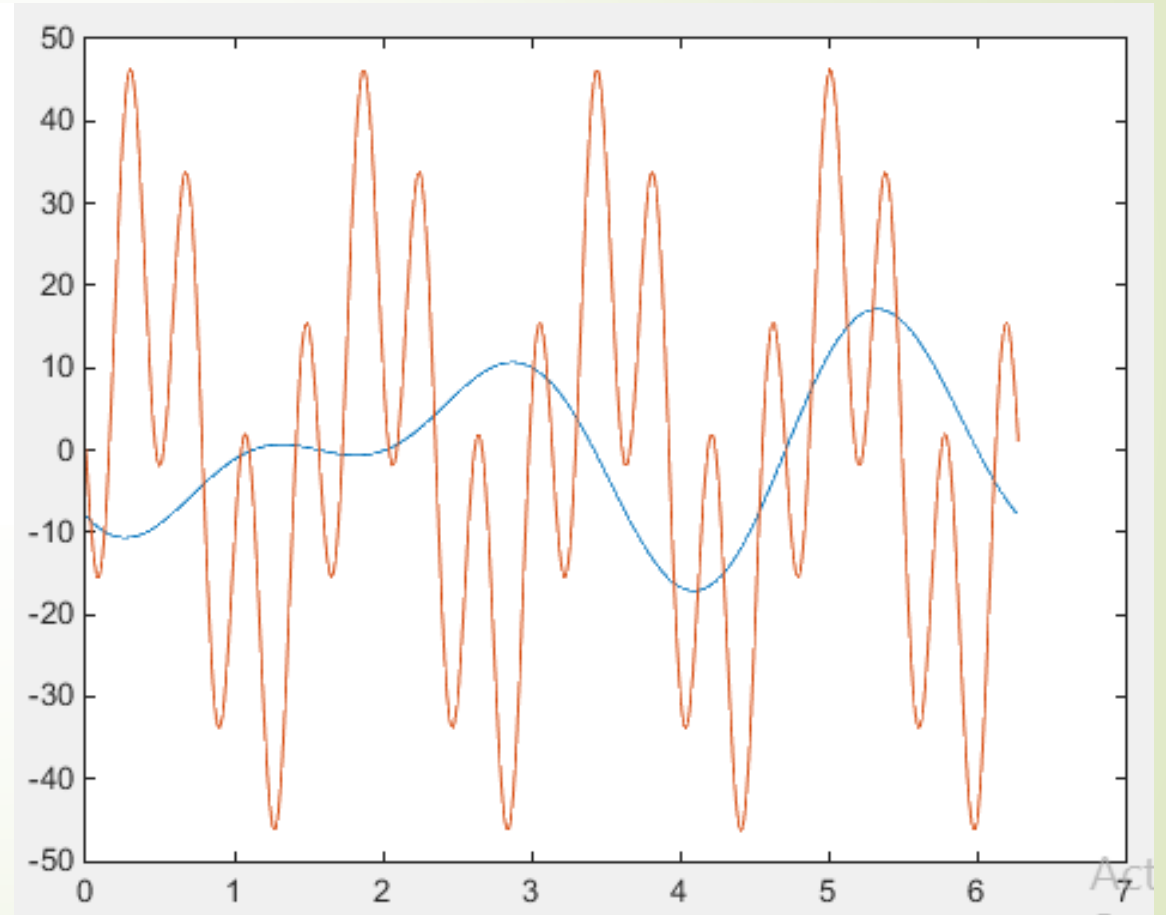
```
x = linspace(0,20);  
y = exp(-x/4).*sin(x);  
plot(x,y);  
xlabel('Sumbu x');  
ylabel('Sumbu y');  
title('Gambar grafik persamaan f(x) = exp(-x/4).*sin(x)');
```



GRAFIK

Grafik Garis 2D

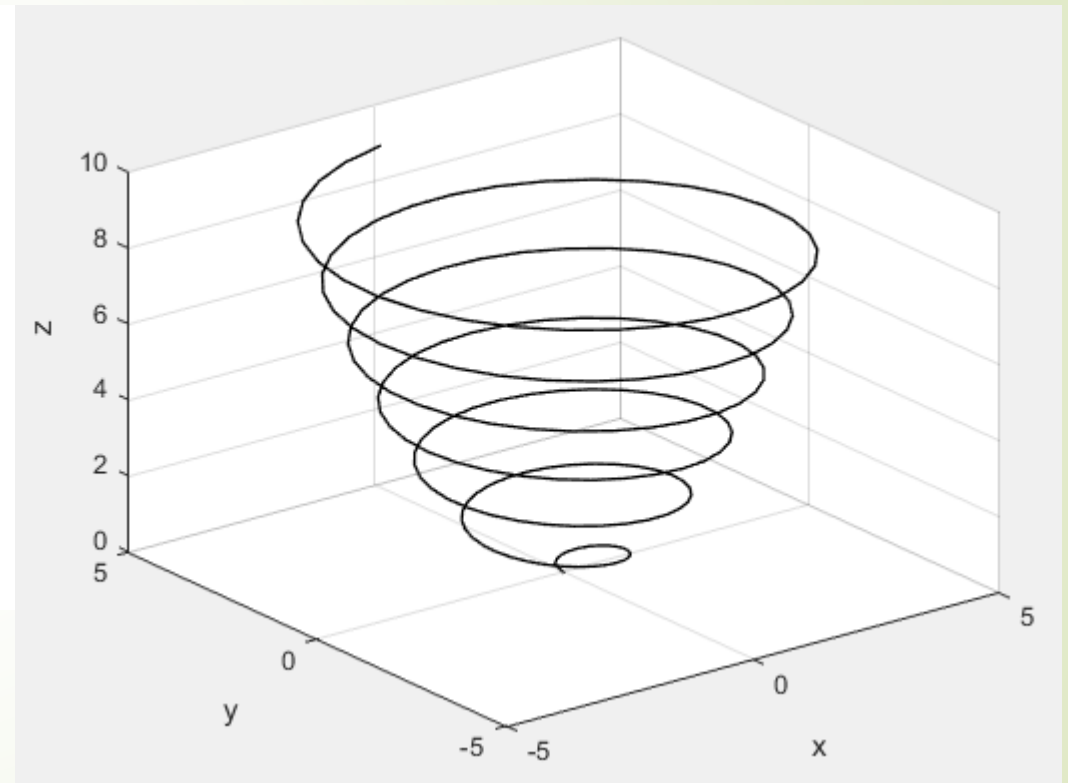
```
x = 0:0.01:2*pi;  
y = -10*sin(2*x) - 8*cos(3*x);  
z = 8*sin(6*x) .* -6.*cos(10*x);  
plot(x,y,x,z);
```



GRAFIK

Grafik Garis 3D : LINE PLOT

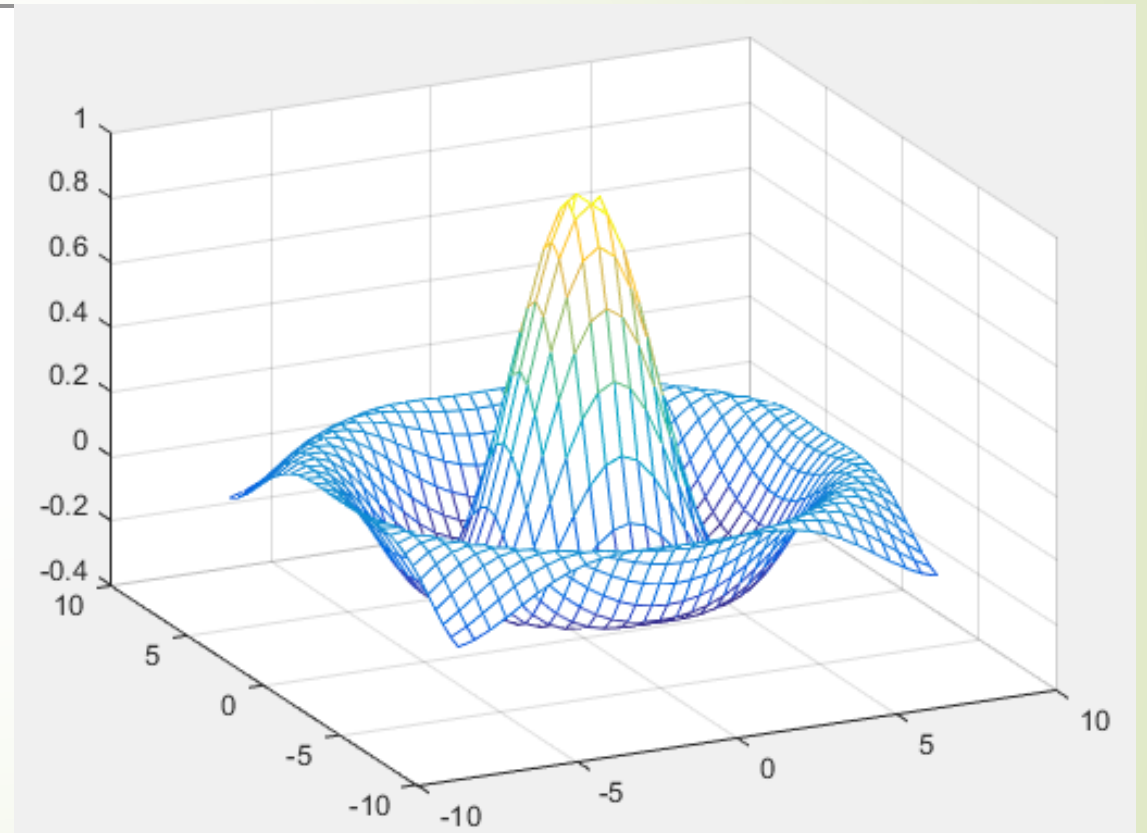
```
t=0:0.1:6*pi;  
x=sqrt(t).*sin(2*t);  
y=sqrt(t).*cos(2*t);  
z=0.5*t;  
plot3(x,y,z,'k','linewidth',1)  
grid on  
xlabel('x'); ylabel('y'); zlabel('z')
```



GRAFIK

Grafik Garis 3D : MESH PLOT

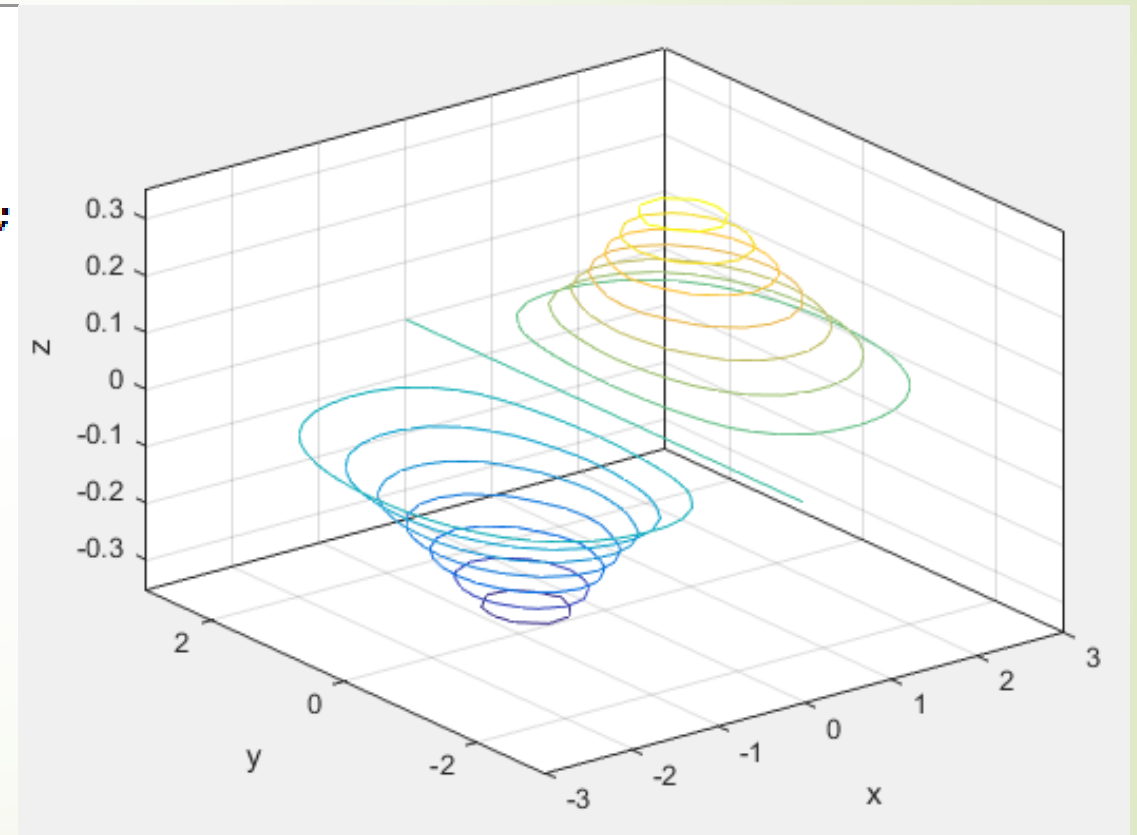
```
x = -7.5:0.5:7.5;  
y = x;  
[X,Y] = meshgrid(x,y);  
R = sqrt(X.^2 + Y.^2);  
Z = sin(R) ./ R;  
mesh(X,Y,Z);
```



GRAFIK

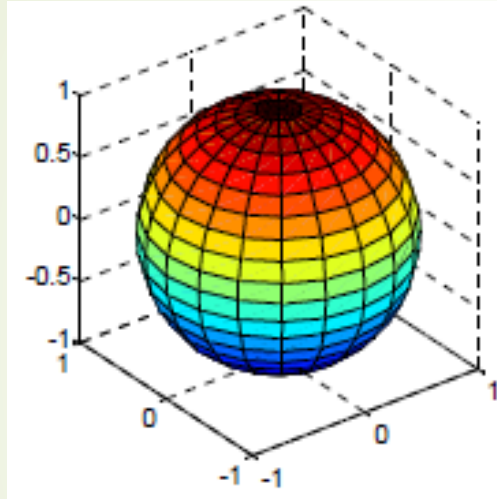
Grafik Garis 3D : CONTOUR PLOT

```
x=-3:0.25:3;  
y=-3:0.25:3;  
[X,Y]=meshgrid(x,y);  
Z=1.8.^(-1.5*sqrt(X.^2+Y.^2)).*cos(0.5*Y).*sin(X);  
contour3(X,Y,Z,15)  
xlabel('x'); ylabel('y')  
zlabel('z')
```

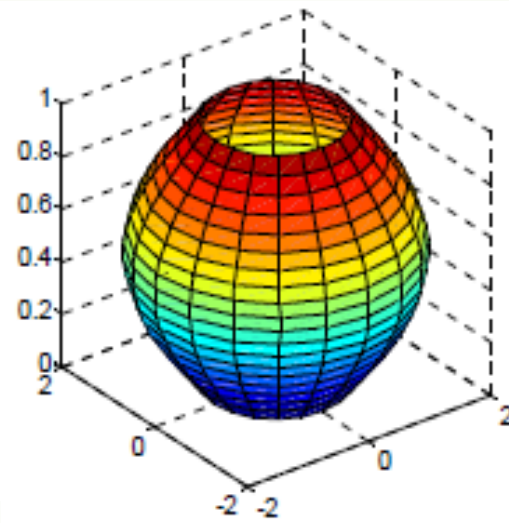


GRAFIK

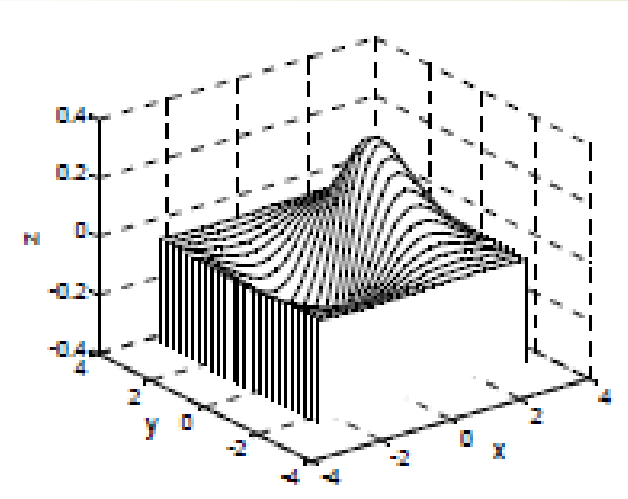
Grafik Garis 3D



Sphere Plot



Cylinder Plot



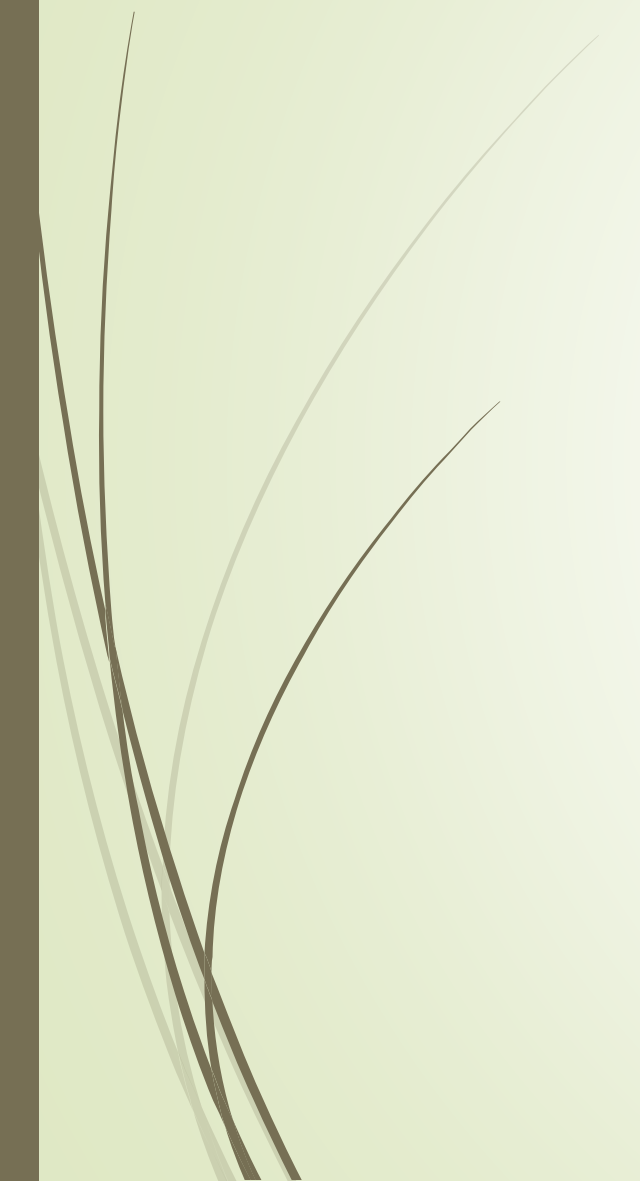
Waterfall Plot



GRAFIK

Grafik Garis 3D

Dan Masih Banyak Lagi
(Bisa dilihat di buku referensi yang aku
sudah kasih)





Untuk materi pertemuan ini nanti saya
share ke WA kalian hehe...



FINISH

Any Question ?