

Matlab

ismertető

2016 ősz

Követelményrendszer

- Előadás: 2db zh (félév közepén és a végén)
- Gyakorlat: 1db zh az utolsó órán
- A gyakorlati zh-n legalább 50%-ot kell elérni!
- Elméleti zh-k átlaga alapján az évközi jegy:
 - 89-100% jeles
 - 76-88% jó
 - 63-75% közepes
 - 51-62% elégséges
 - 0-50% elégtelen
- Pótlás: TVSz szerint a vizsgaidőszakban

Ajánlott irodalom:

- S. Gisbert: MATLAB, Typotex Kft, Budapest, 2005, ISBN 963 9548 49 9
– *(Google Books)*

HOME | PLOTS | APPS

Search Documentation

FILE | VARIABLE | CODE | SIMULINK | ENVIRONMENT | RESOURCES

- FILE: New Script, New, Open, Find Files, Compare
- VARIABLE: Import Data, Save Workspace, New Variable, Open Variable, Clear Workspace
- CODE: Analyze Code, Run and Time, Clear Commands
- SIMULINK: Simulink Library
- ENVIRONMENT: Layout, Set Path, Parallel, Preferences
- RESOURCES: Help, Add-Ons, Request Support, Community

C:\Users\admin\Documents\MATLAB

Current Folder

Name

Details

Select a file to view details

Command Window

New to MATLAB? Watch this [Video](#), see [Examples](#), or read [Getting Started](#).

```
f> >> |
```

Workspace

Name	Value

Command History

----- 2015.09.07. 12:34 -----

Értékadás

```
>> a=10
```

```
a =
```

```
10
```

```
>> A=1
```

```
A =
```

```
1
```

```
>> A+a
```

```
ans =
```

```
11
```

```
>> a= [0,1,2]
```

```
a =
```

```
0 1 2
```

```
>> a= [0,1,2]'
```

```
a =
```

```
0
```

```
1
```

```
2
```

```
>> M=[1,2,3;4,5,6;7,8,9]
```

M =

1 2 3

4 5 6

7 8 9

```
>> a = [0:0.1:1]'
```

```
0.9000
```

```
a =
```

```
1.0000
```

```
0
```

```
0.1000
```

```
0.2000
```

```
0.3000
```

```
0.4000
```

```
0.5000
```

```
0.6000
```

```
0.7000
```

```
0.8000
```

```
>> ones(3)
```

```
ans =
```

```
1 1 1
```

```
1 1 1
```

```
1 1 1
```

```
>> zeros(3)
```

```
ans =
```

```
0 0 0
```

```
0 0 0
```

```
0 0 0
```



```
>> length(a)
```

```
ans =
```

```
11
```

```
>> b=-1
```

```
b =
```

```
-1
```

```
>> abs(b)
```

```
ans =
```

```
1
```

```
>> a = rand(3)
```

```
a =
```

```
0.9649    0.9572    0.1419  
0.1576    0.4854    0.4218  
0.9706    0.8003    0.9157
```

```
>> a=a*10
```

```
a =
```

```
9.6489    9.5717    1.4189  
1.5761    4.8538    4.2176  
9.7059    8.0028    9.1574
```

```
>> a = rand(3,1)
```

```
a =
```

```
0.0357
```

```
0.8491
```

```
0.9340
```

```
>> a=a*10
```

```
a =
```

```
0.3571
```

```
8.4913
```

```
9.3399
```

```
>> min(a)
```

```
ans =
```

```
0.3571
```

```
>> max(a)
```

```
ans =
```

```
9.3399
```

```
>> size(a)
```

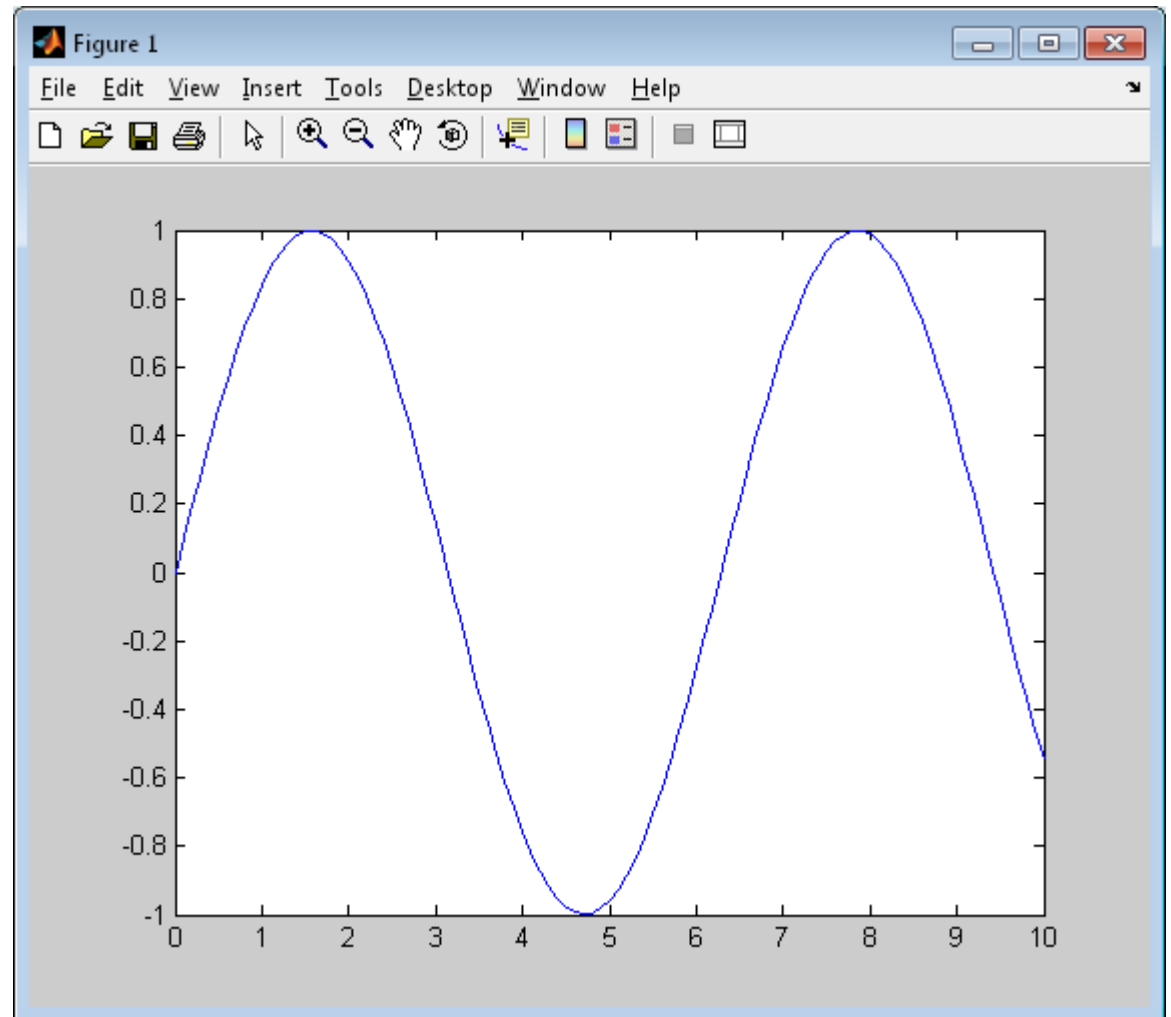
```
ans =
```

```
3 3
```

```
x=[0:0.1:10];
```

```
y=sin(x);
```

```
plot(x,y);
```



```
x=[0:0.1:10];
```

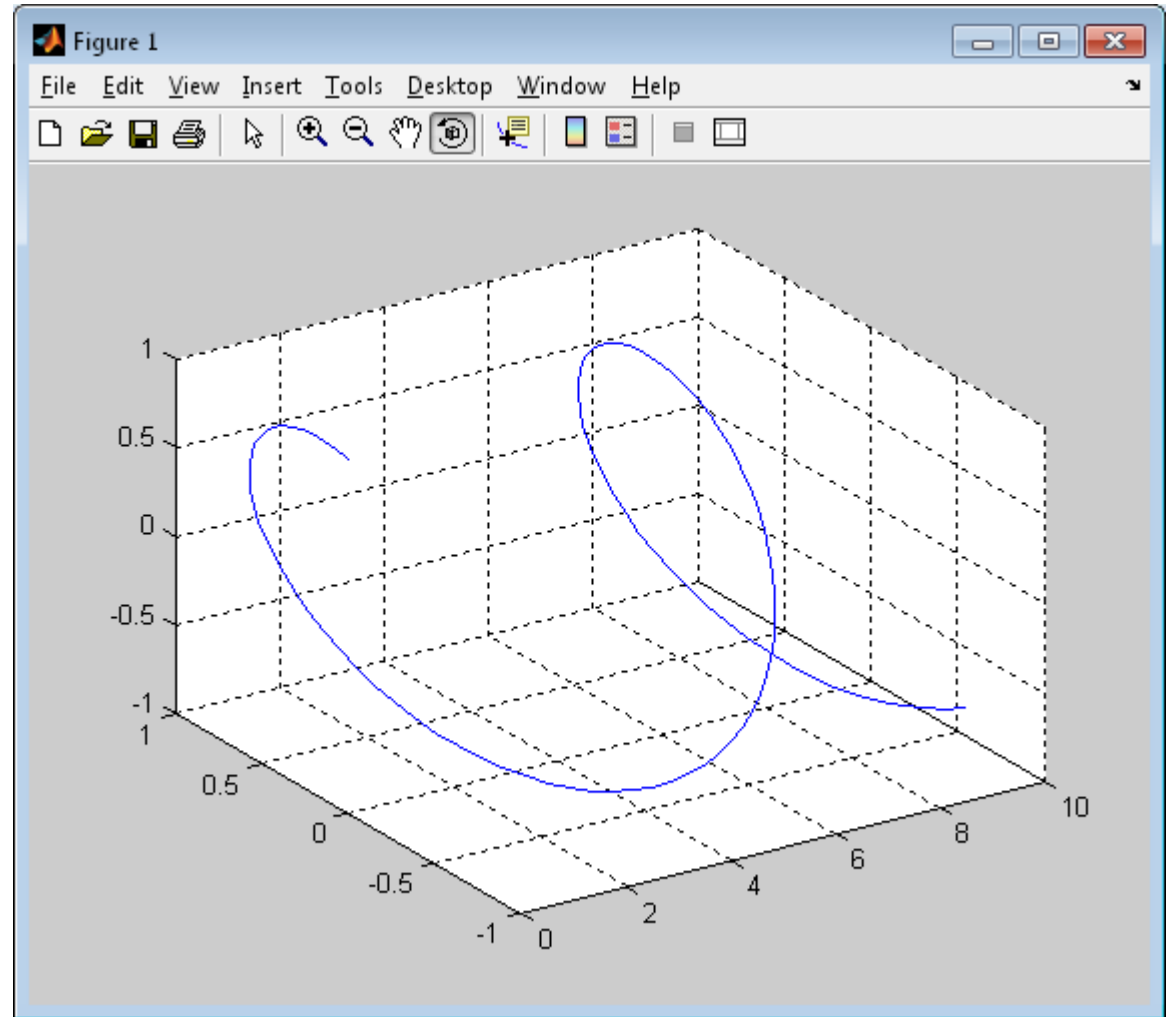
```
y=sin(x);
```

```
plot(x,y);
```

```
z=cos(x);
```

```
plot3(x,y,z);
```

```
grid
```



Plot tulajdonságok

```
plot(x,y,'-');
```

```
plot(x,y,'.');
```

```
plot(x,y,'+');
```

```
plot(x,y,'*');
```

```
plot(x,y,'- ');
```

```
plot(x,y,'--');
```

```
plot(x,y,'-+');
```

```
plot(x,y,'-*');
```

```
plot(x,y,'-o');
```

```
plot(x,y,'-s');
```

```
plot(x,y,'--o');
```

```
plot(x,y,'--s');
```

Plot tulajdonságok

```
plot(x,y,'-+r');
```

```
plot(x,y,'-+g');
```

```
plot(x,y,'-+b');
```

```
plot(x,y,'-+k');
```

```
plot(x,y,'-+k', 'LineWidth',2);
```

```
plot(x,y,'-ko', 'LineWidth',2,'MarkerEdgeColor','k',  
      'MarkerFaceColor','g','MarkerSize',10)
```

Plot tulajdonságok

```
xlabel('X axis');
```

```
ylabel('Y axis');
```

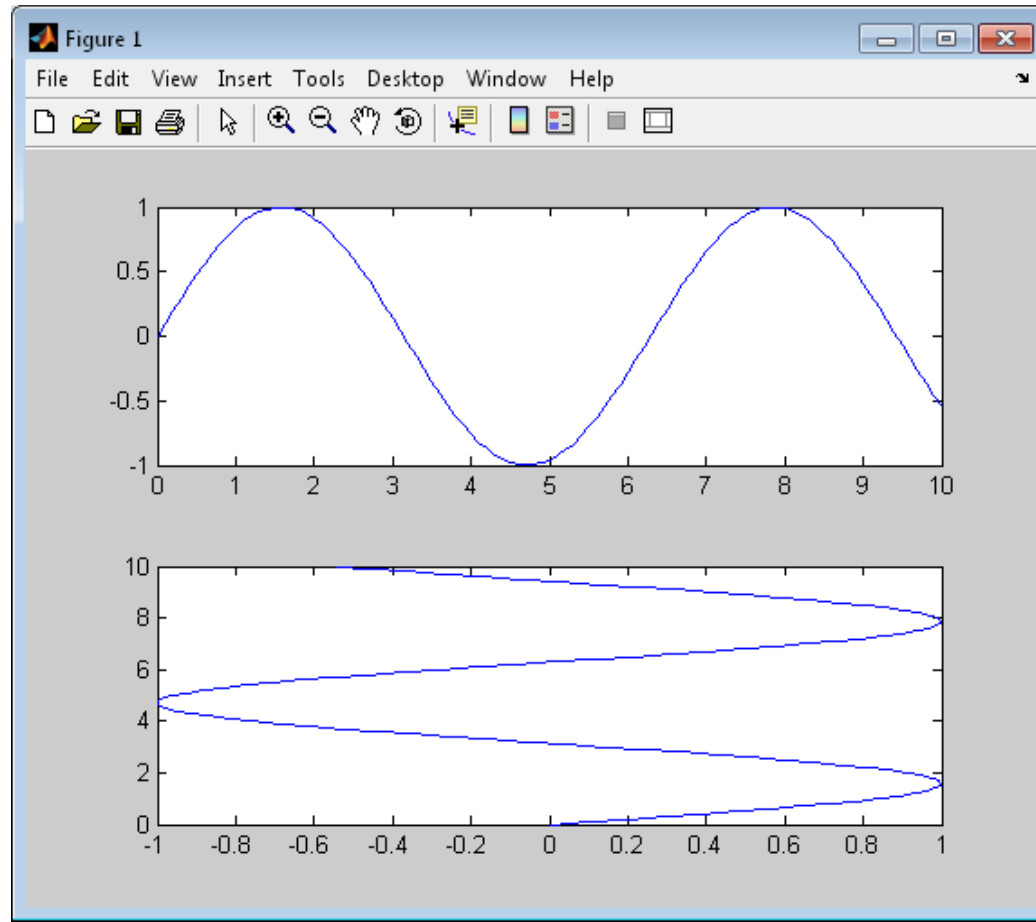
```
ylim([-0.2 0.5]);
```

```
xlim([2 3.5]);
```


Subplot

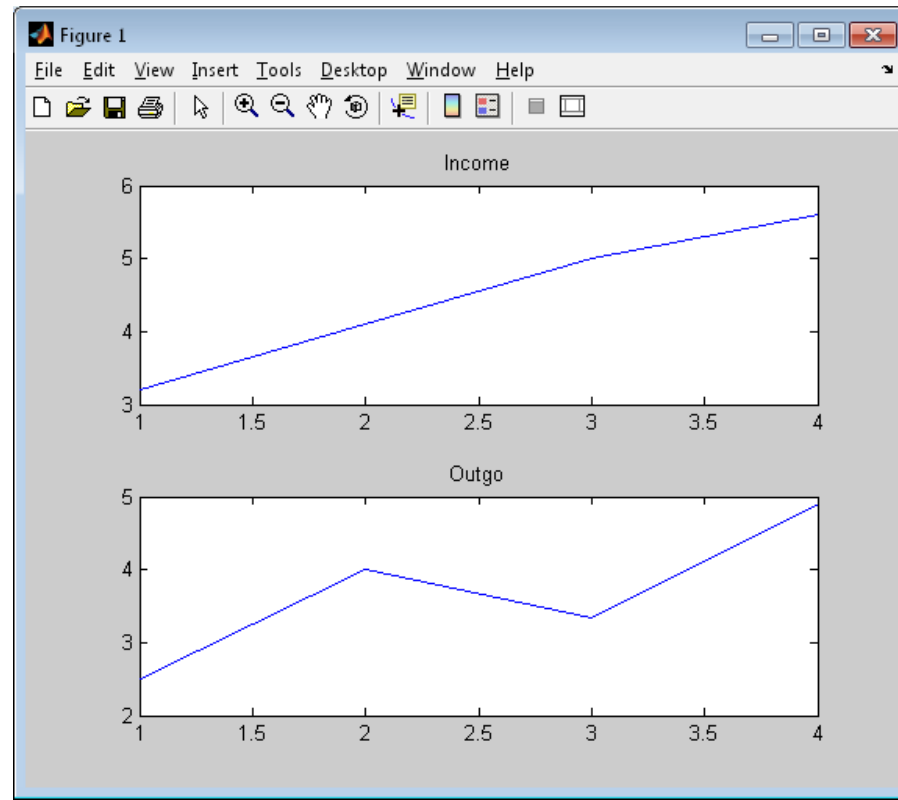
`subplot(2,1,1), plot(x, y);`

`subplot(2,1,2), plot(y, x);`



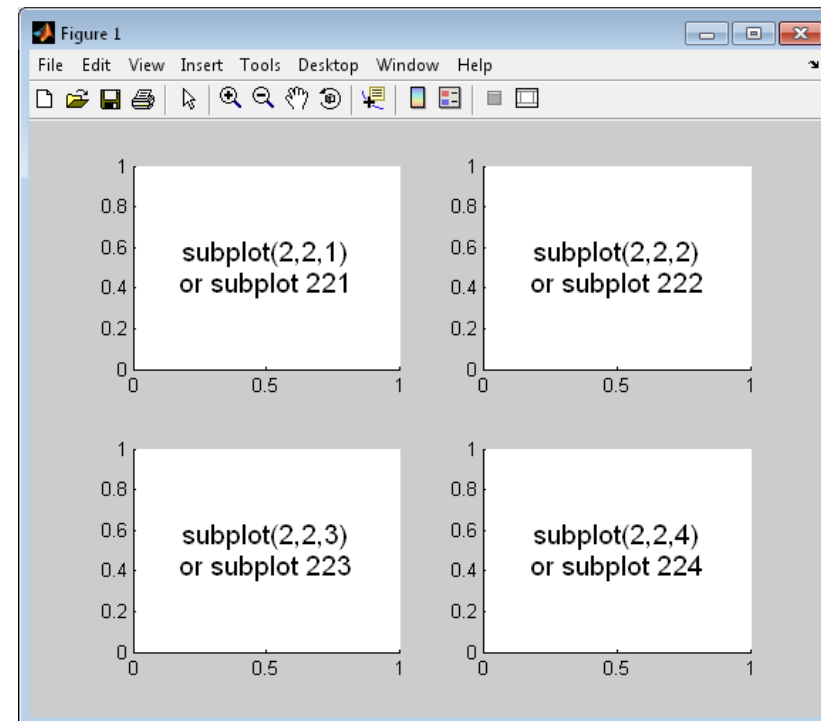
Subplot példa

```
>> income = [3.2,4.1,5.0,5.6];  
outgo = [2.5,4.0,3.35,4.9];  
subplot(2,1,1); plot(income)  
title('Income')  
subplot(2,1,2); plot(outgo)  
title('Outgo')
```

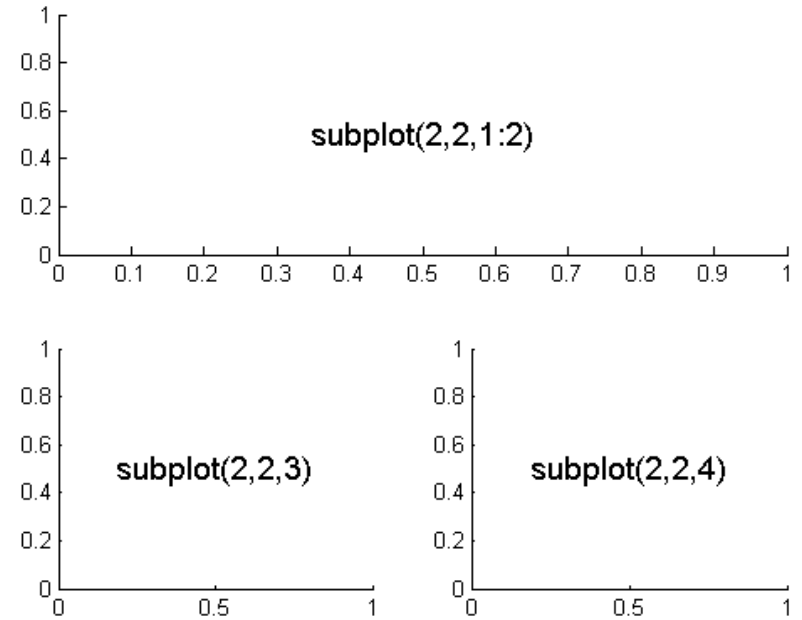
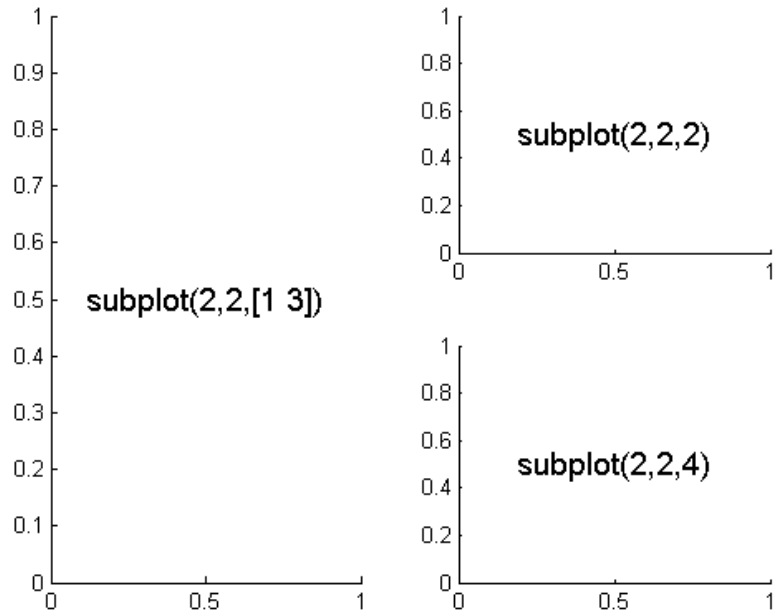


Subplot példa

```
>> figure
subplot(2,2,1)|
text(.5,.5,{'subplot(2,2,1)';'or subplot 221'},...
     'FontSize',14,'HorizontalAlignment','center')
subplot(2,2,2)
text(.5,.5,{'subplot(2,2,2)';'or subplot 222'},...
     'FontSize',14,'HorizontalAlignment','center')
subplot(2,2,3)
text(.5,.5,{'subplot(2,2,3)';'or subplot 223'},...
     'FontSize',14,'HorizontalAlignment','center')
subplot(2,2,4)
text(.5,.5,{'subplot(2,2,4)';'or subplot 224'},...
     'FontSize',14,'HorizontalAlignment','center')
```

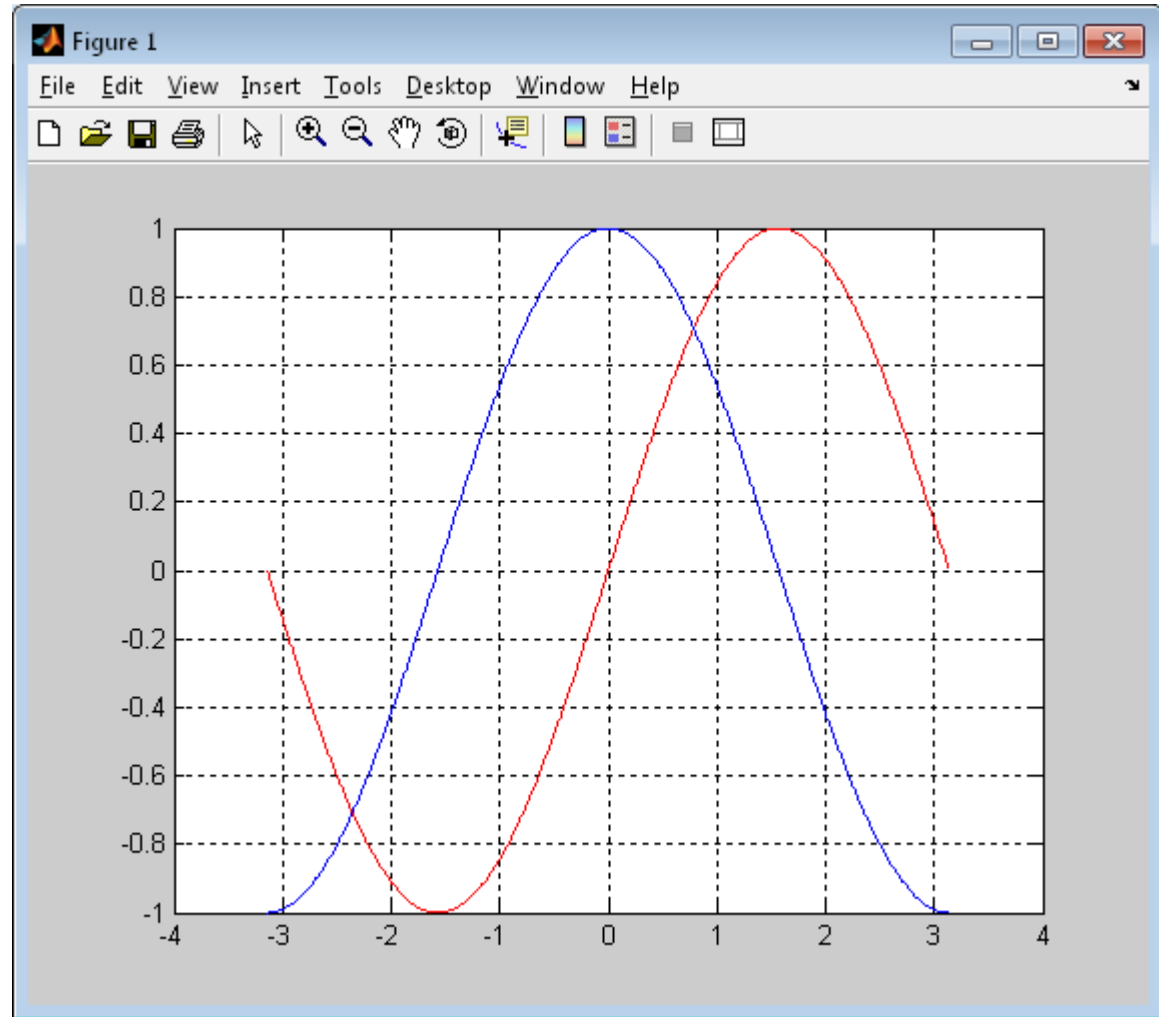


Subplot példa



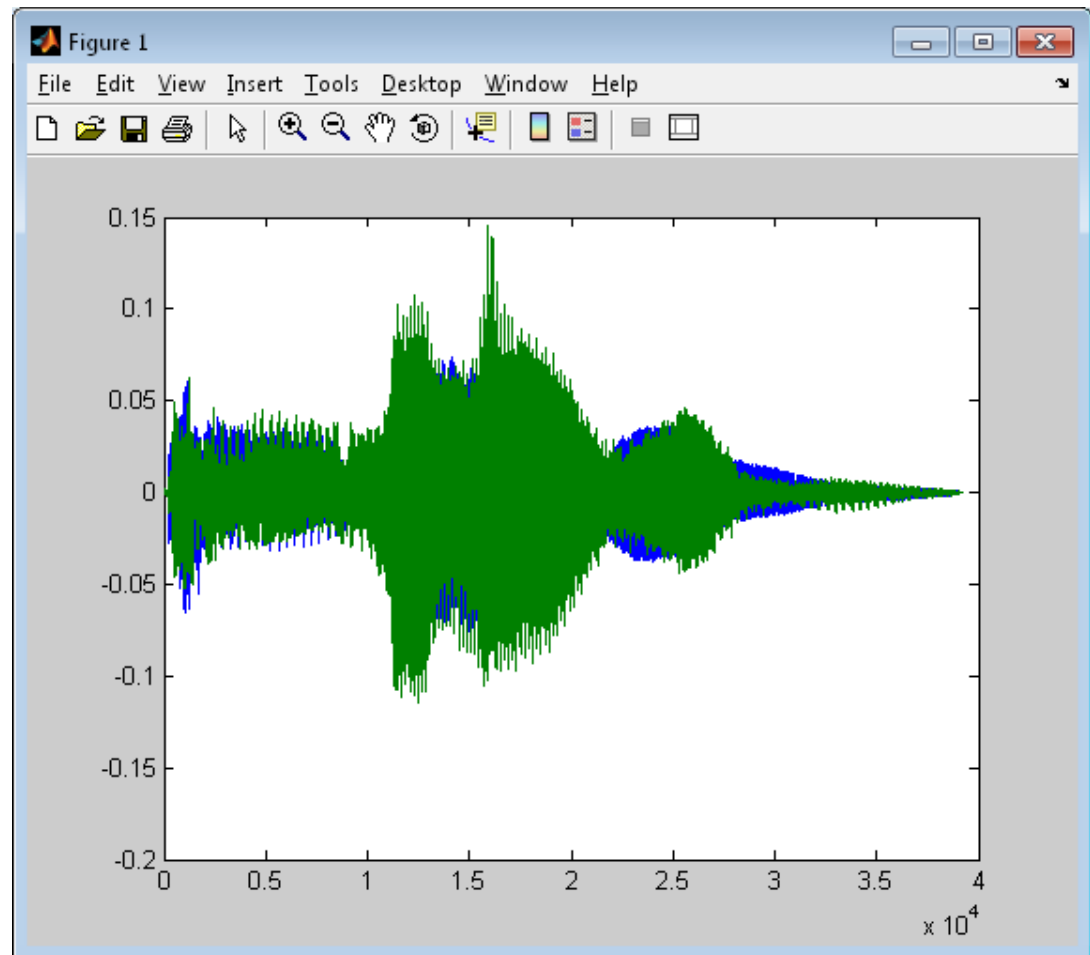
Hold

```
x=[-pi:0.01:pi];  
y1=sin(x);  
y2=cos(x);  
plot(x,y1,'-r')  
hold on  
plot(x,y2,'-b')  
grid
```



Hangok

```
[x, fs] = wavread('win.wav');  
sound(x, fs);  
plot(x);
```



Hangok

```
fs = 44100; f0 = 200; % mintavételi frekvencia és  
    alapfrekvencia
```

```
T = 2; % időtartam
```

```
n = [0:fs*T]; % időtengely (minta)
```

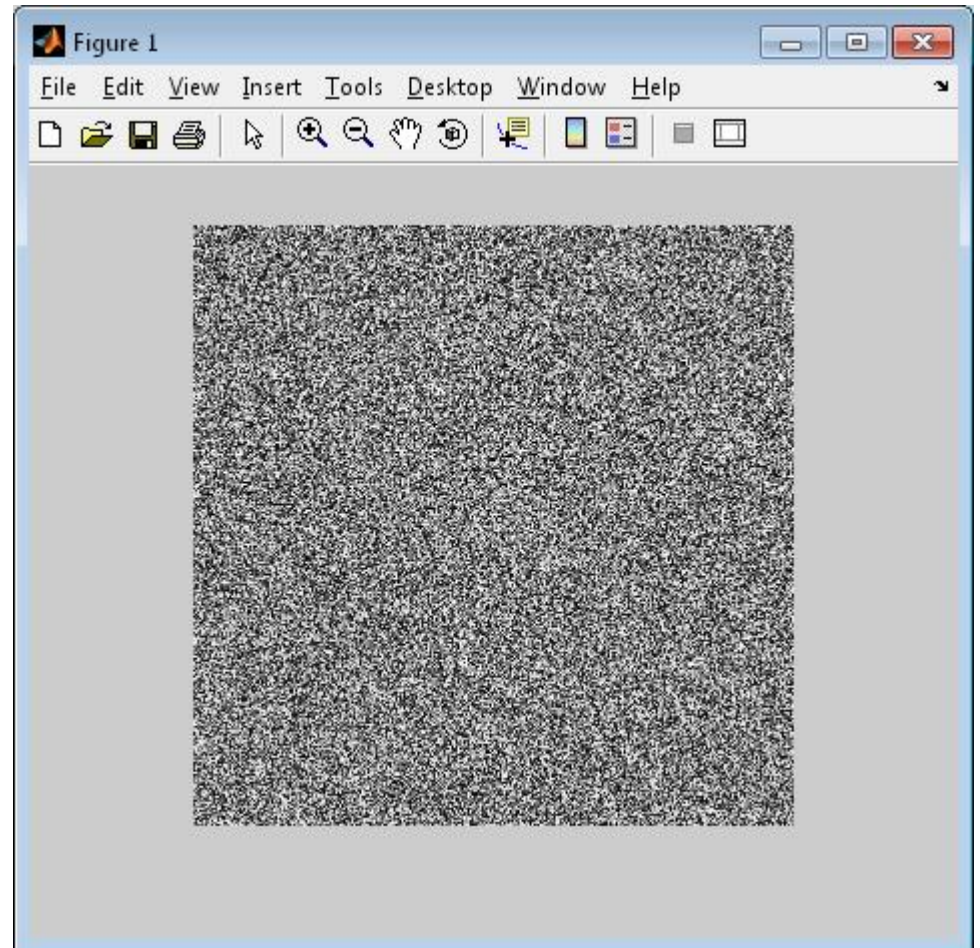
```
x = sin(2*pi*f0*n/fs); % a jel
```

```
plot(n/fs, x)
```

```
sound(x, fs)
```

Képek

```
img=rand(300);  
imshow(img)
```



Képek

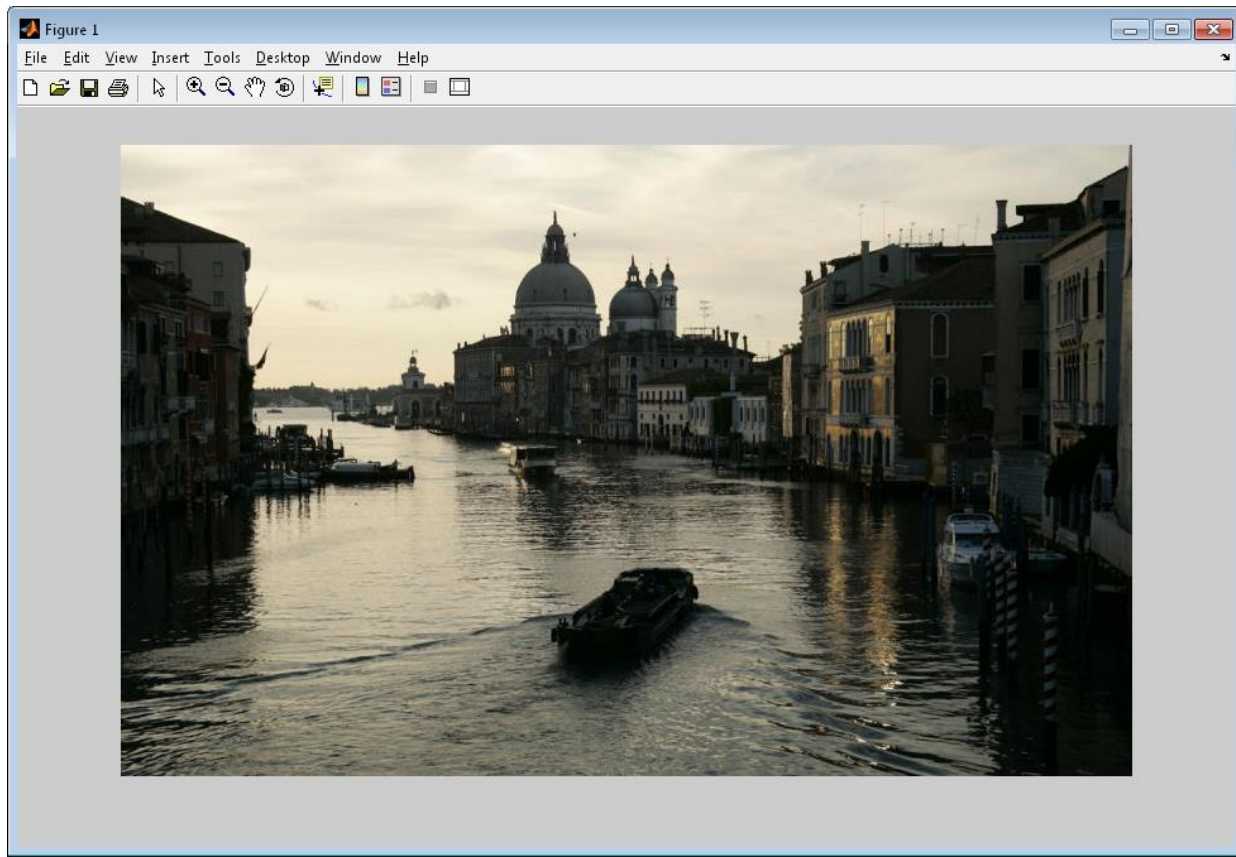
```
img=imread('img.jpg');
```

```
imshow(img)
```

```
size(img)
```

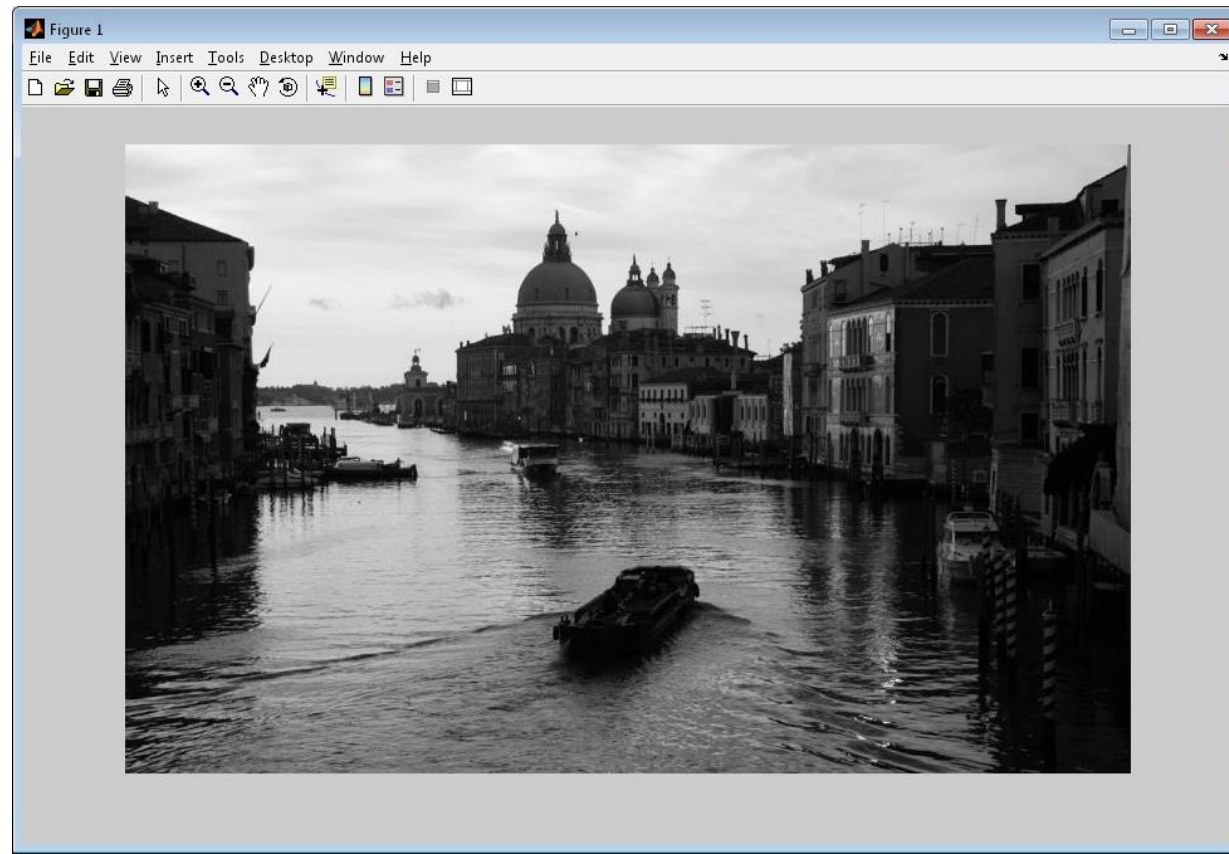
```
ans =
```

```
500 800 3
```



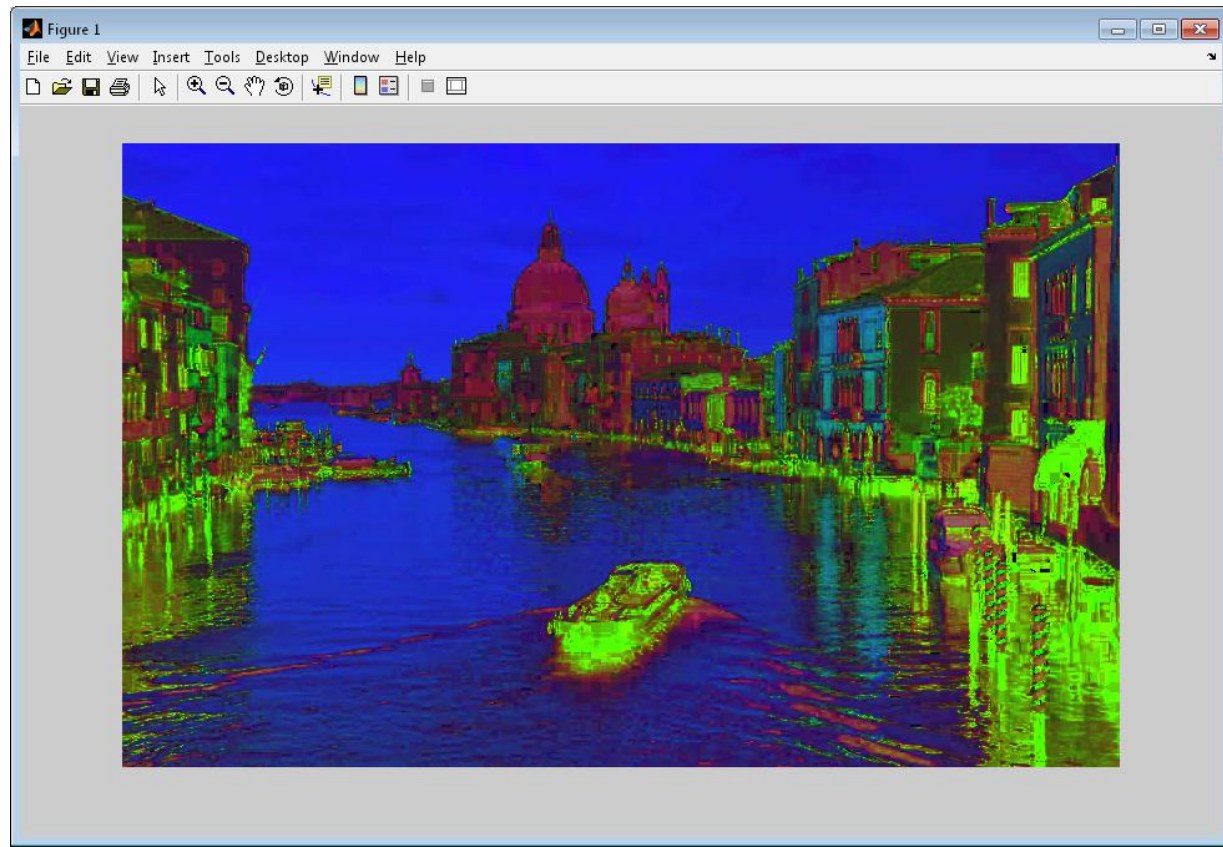
Képek

```
img2=rgb2gray(img);  
imshow(img2)
```



Képek

```
img2=rgb2hsv(img);  
imshow(img2)
```



Képek

figure

subplot(3,1,1)

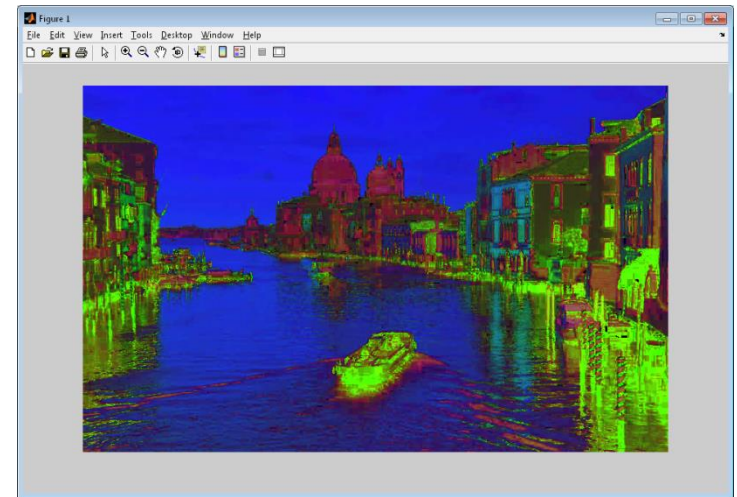
imshow(img2(:,:,1))

subplot(3,1,2)

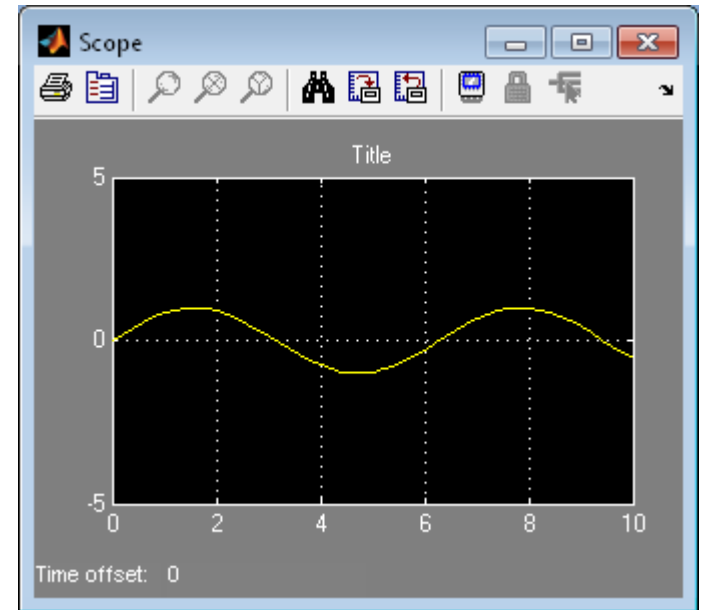
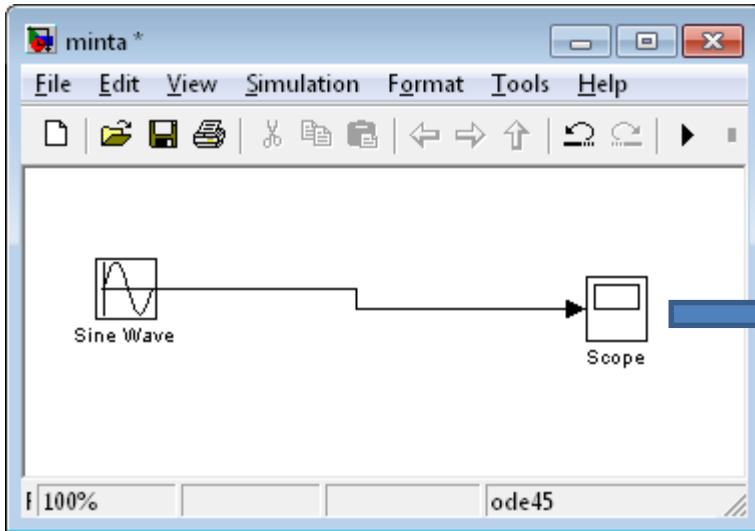
imshow(img2(:,:,2))

subplot(3,1,3)

imshow(img2(:,:,3))



Simulink



Függvény ábrázolás

- <http://users.nik.uni-obuda.hu/kissdani>
 - [Függvényvizsgálat \(bonyolultabb példákkal\)](#)

$$f(x) = x + \frac{2x}{x^2 - 1}$$

```
x=[-5:0.01:5]
```

```
y=x + (2*x./ (x.*x-1) )
```

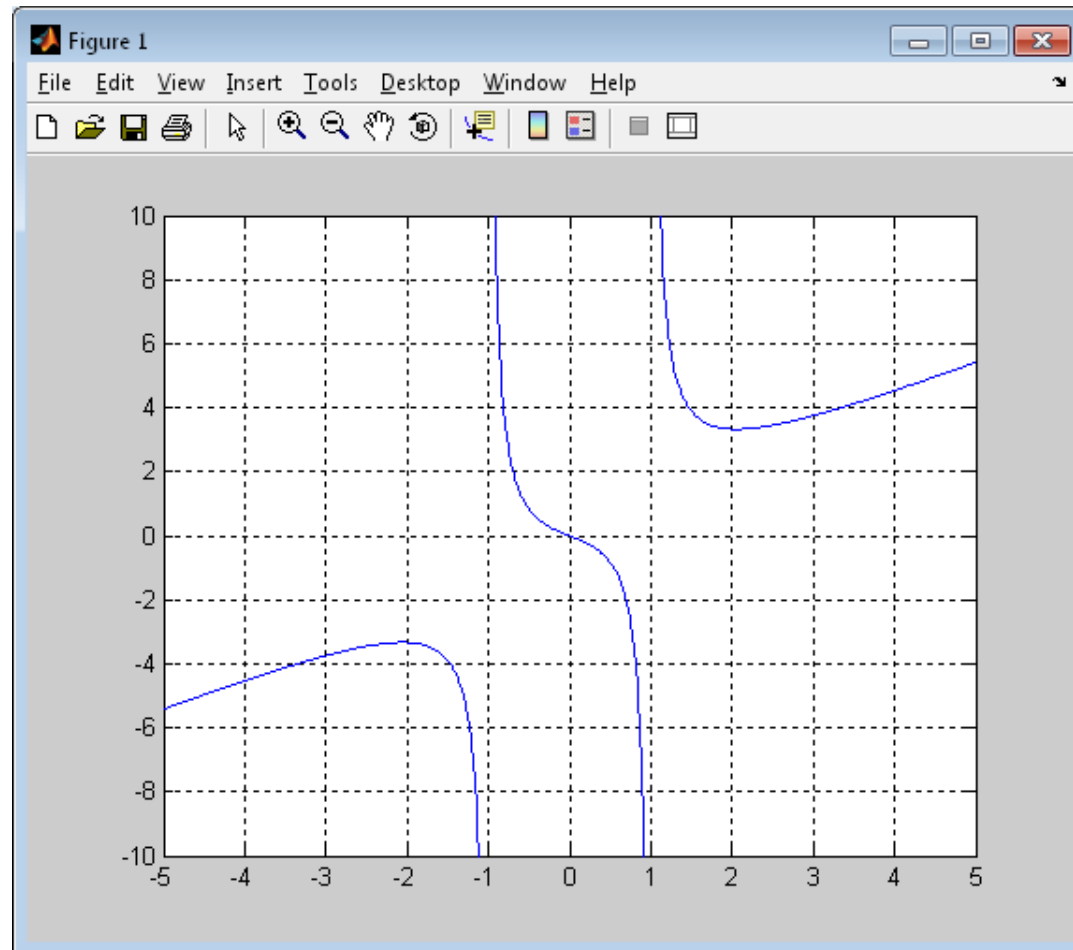
```
plot(x,y)
```

```
Grid
```

```
xlim([-5 5])
```

```
ylim([-10 10])
```

$$f(x) = x + \frac{2x}{x^2 - 1}$$



$$f(x) = \sqrt{1 - e^{-x^2}}$$

```
x=[-5:0.01:5]
```

```
y=sqrt(1-exp(1).^(-x.^2))
```

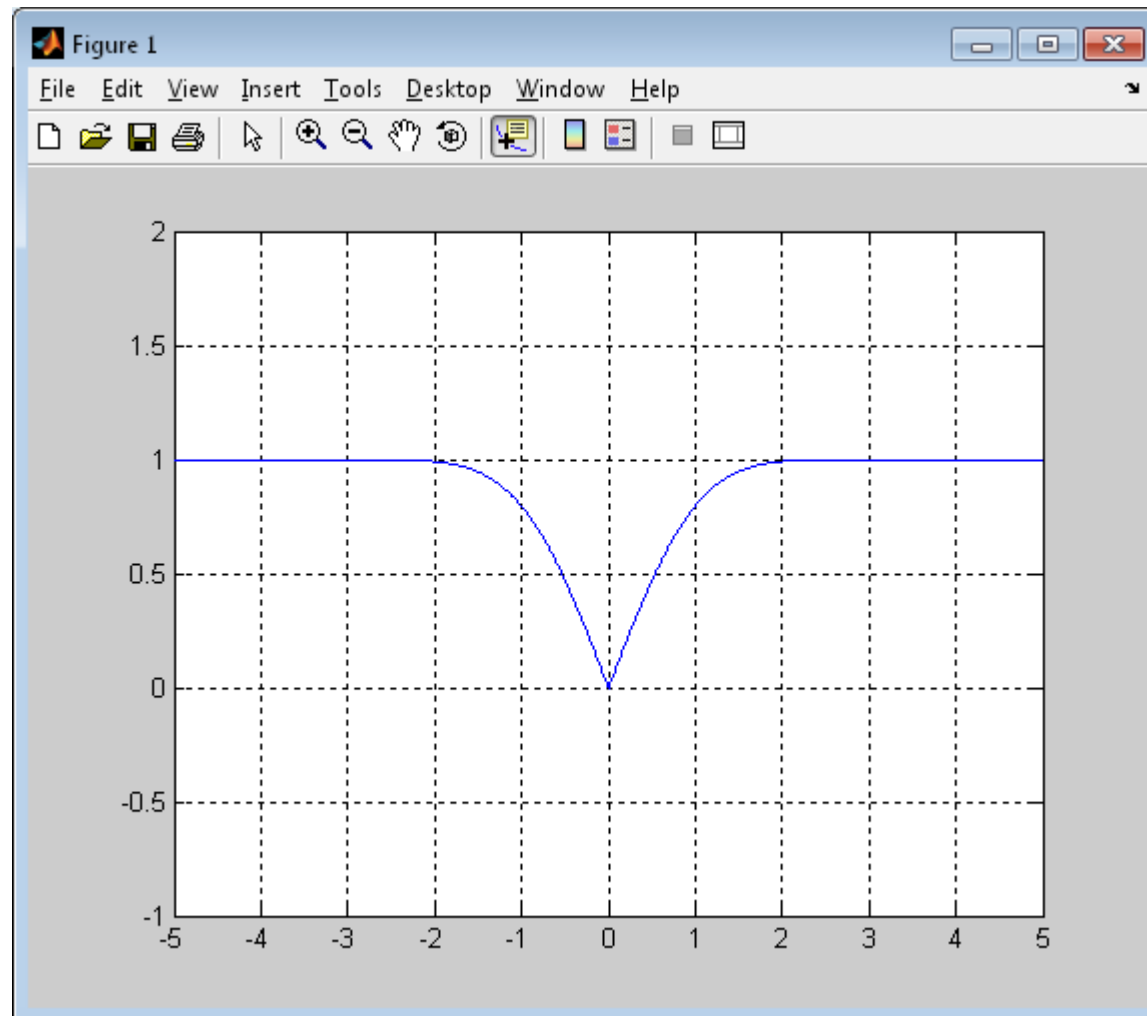
```
plot(x,y)
```

```
Grid
```

```
xlim([-5 5])
```

```
ylim([-1 2])
```

$$f(x) = \sqrt{1 - e^{-x^2}}$$



$$f(x) = \sin(\sin(x))$$

```
x=[-10:0.01:10]
```

```
y=sin(sin(x))
```

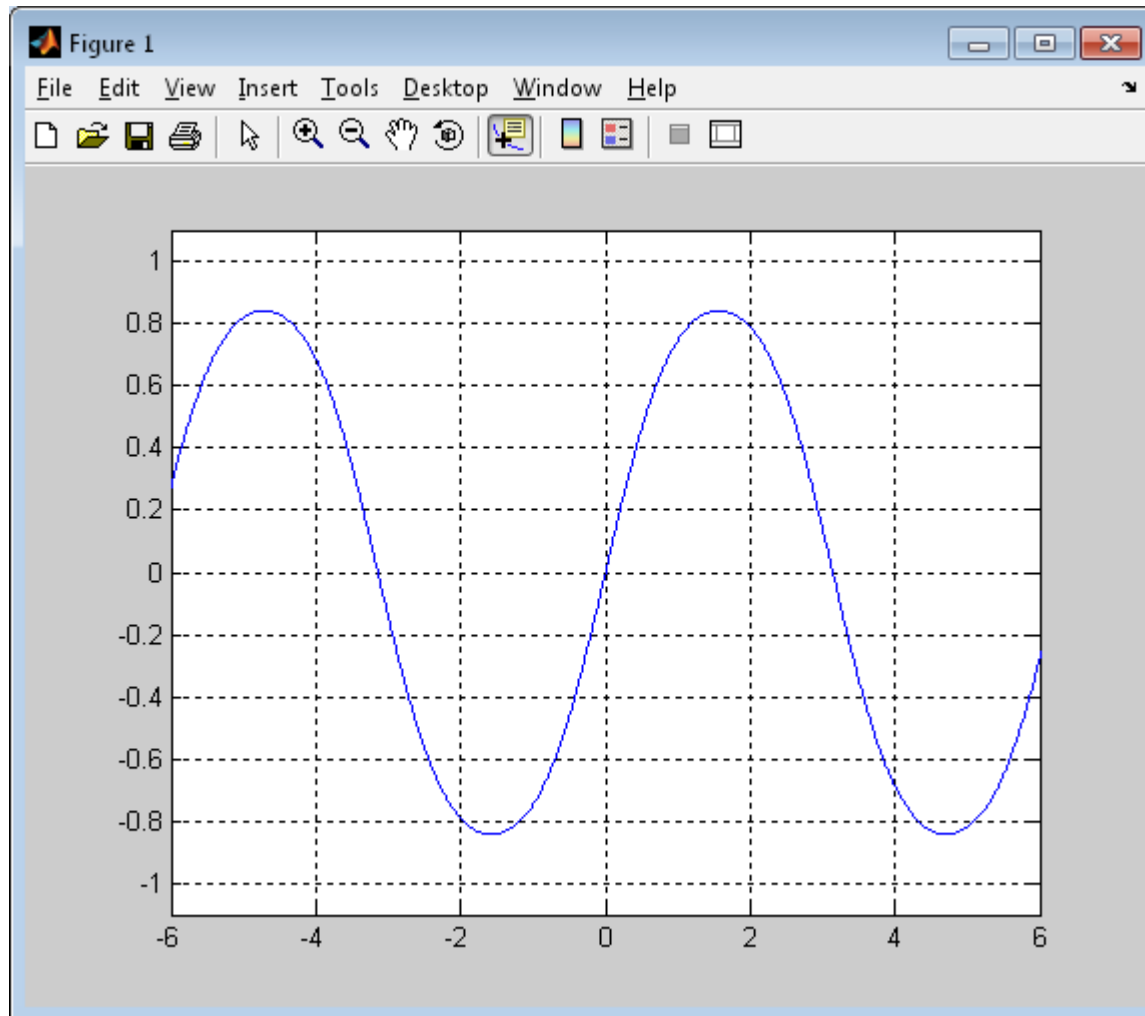
```
plot(x,y)
```

```
Grid
```

```
xlim([-6 6])
```

```
ylim([-1.1 1.1])
```

$$f(x) = \sin(\sin(x))$$

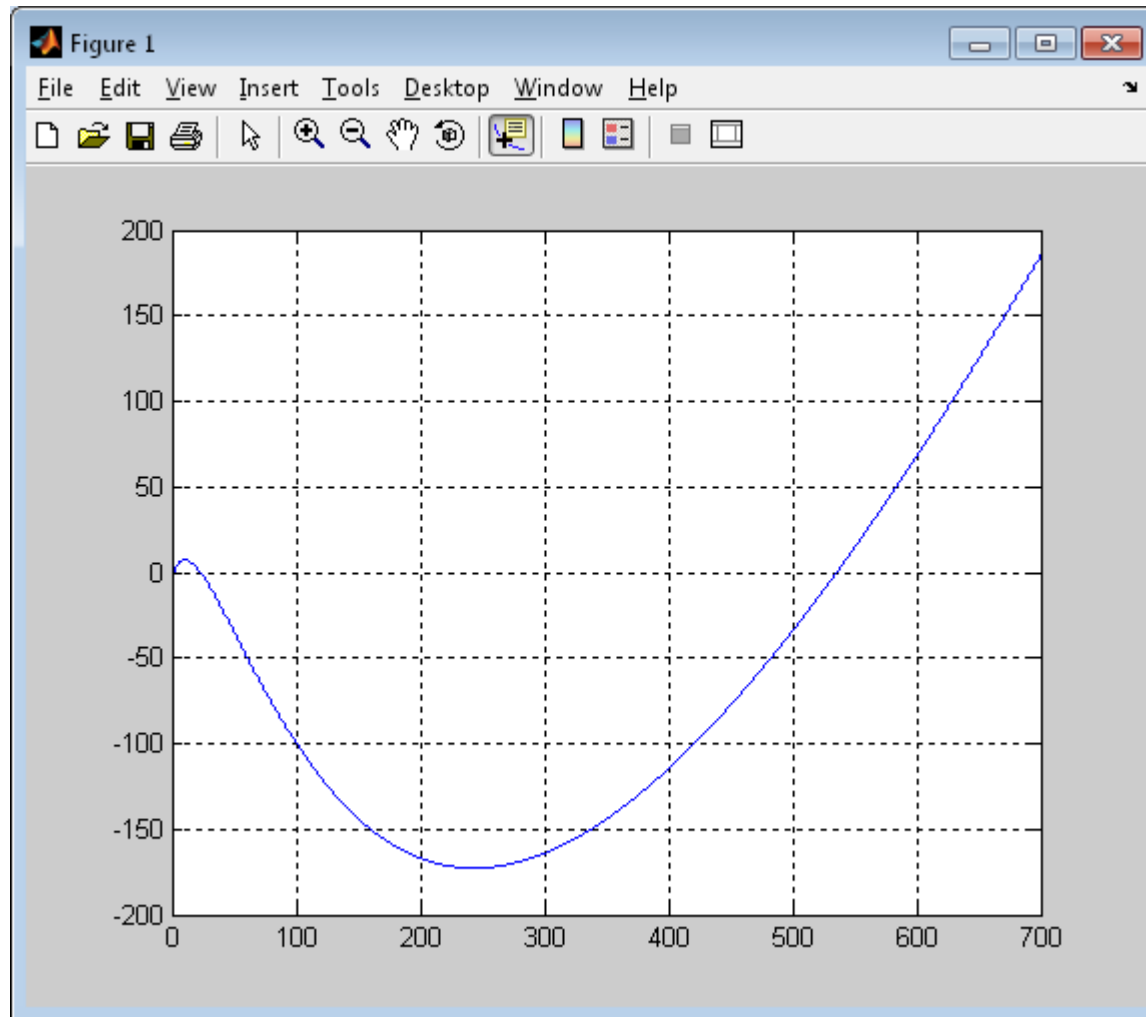


$$f(x) = x \cdot \sin(\ln(x))$$

```
x=[0:0.1:700]
y=x.*sin(log(x));
plot(x,y)
grid
```

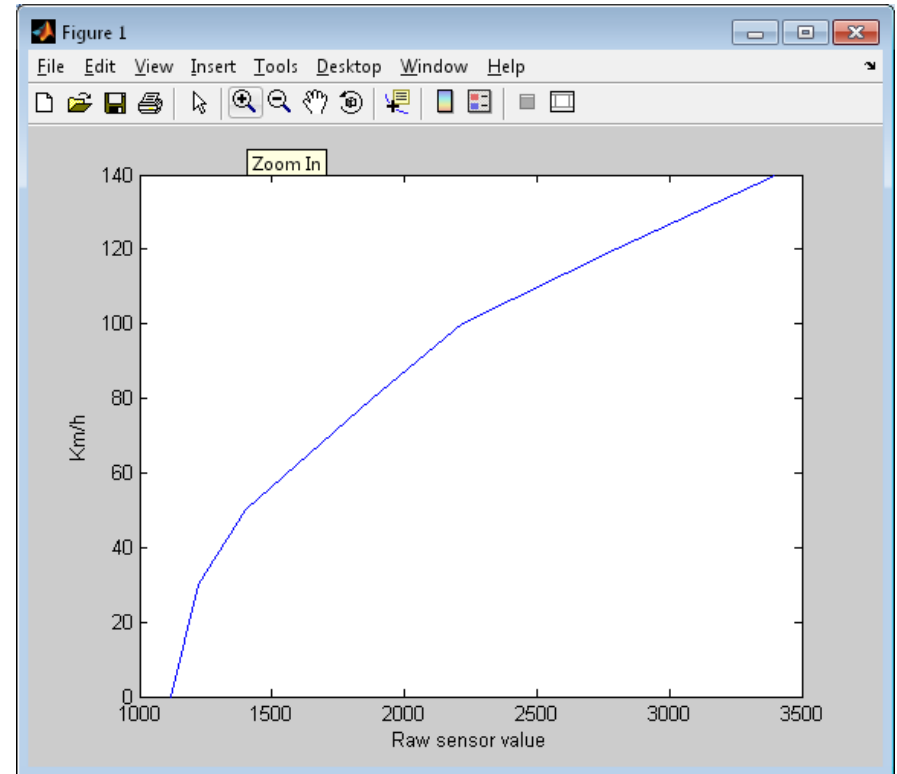
Log(x) => ln x
Log2(x) => log₂ x
Log10(x) => log₁₀ x

$$f(x) = x \cdot \sin(\ln(x))$$



Közelítő függvények alkalmazása

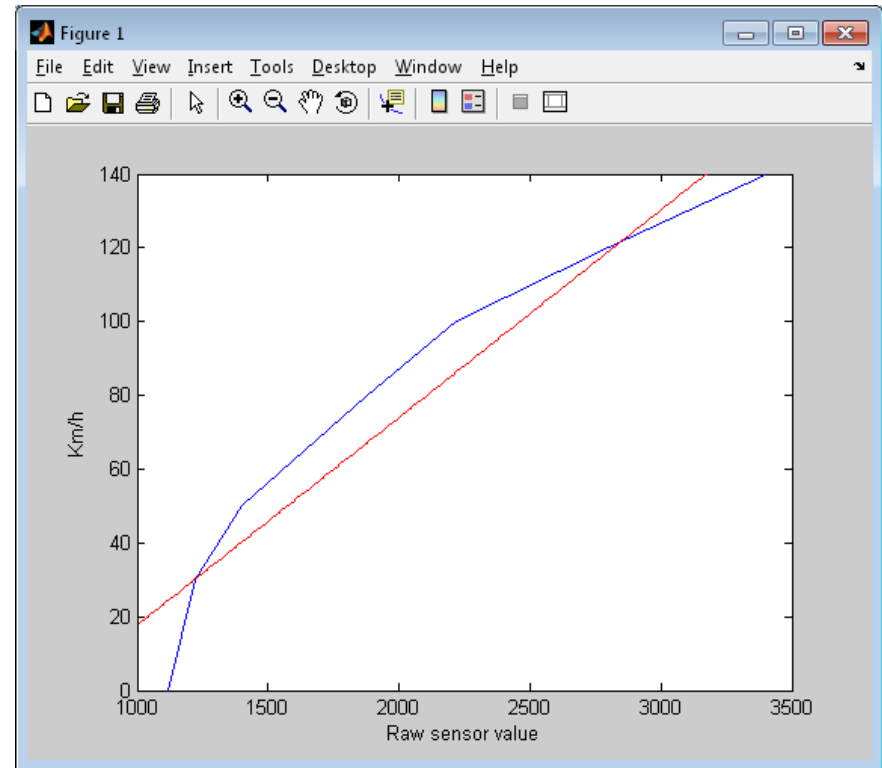
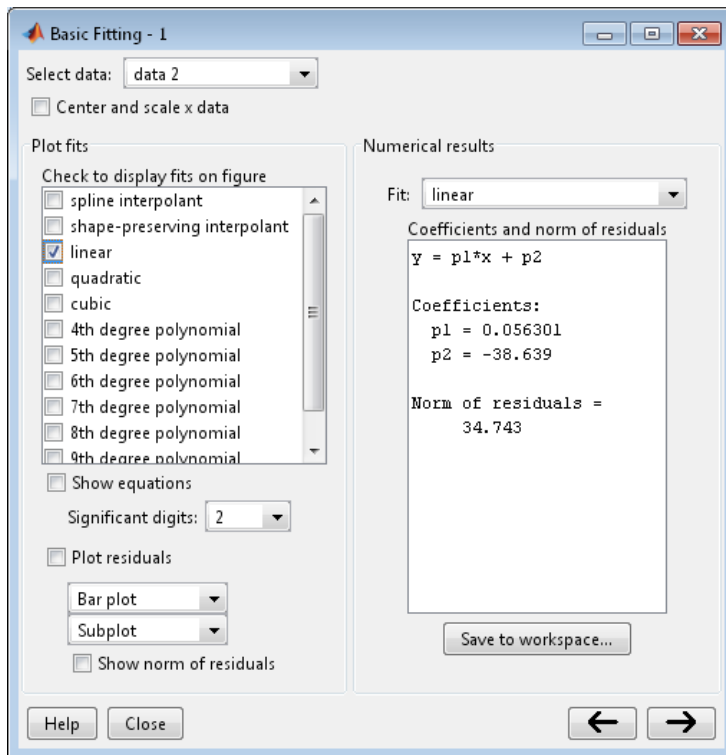
```
airspeed=[  
0    1120    ;  
30   1220    ;  
50   1400    ;  
80   1880    ;  
100  2220    ;  
120  2800    ;  
140  3400    ;  
]
```



```
plot(airspeed(:,2), airspeed(:,1))  
ylabel('Km/h')  
xlabel('Raw sensor value')
```

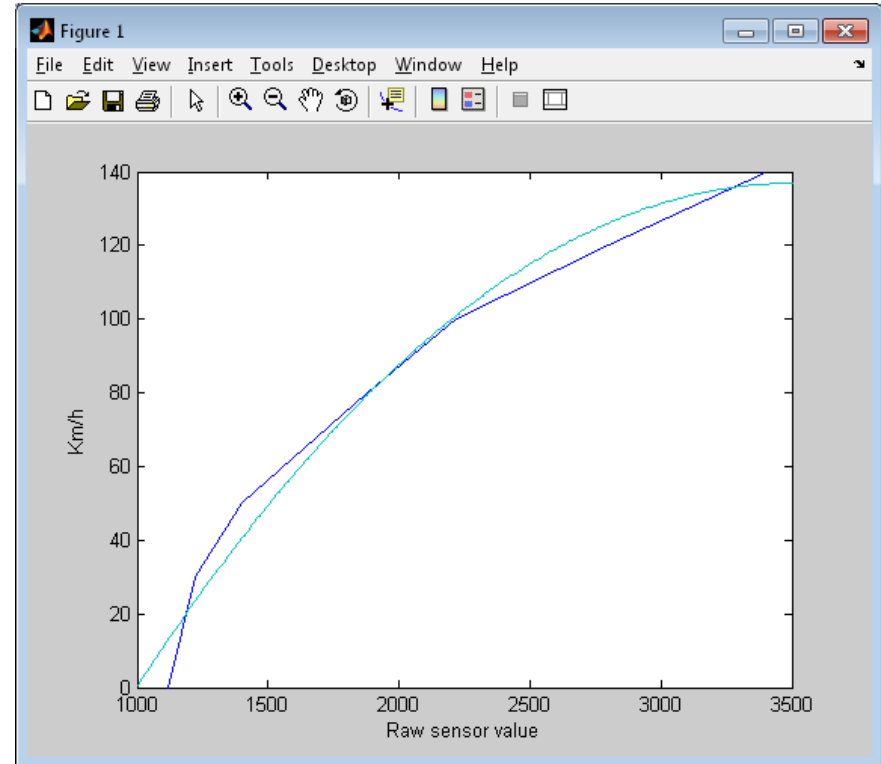
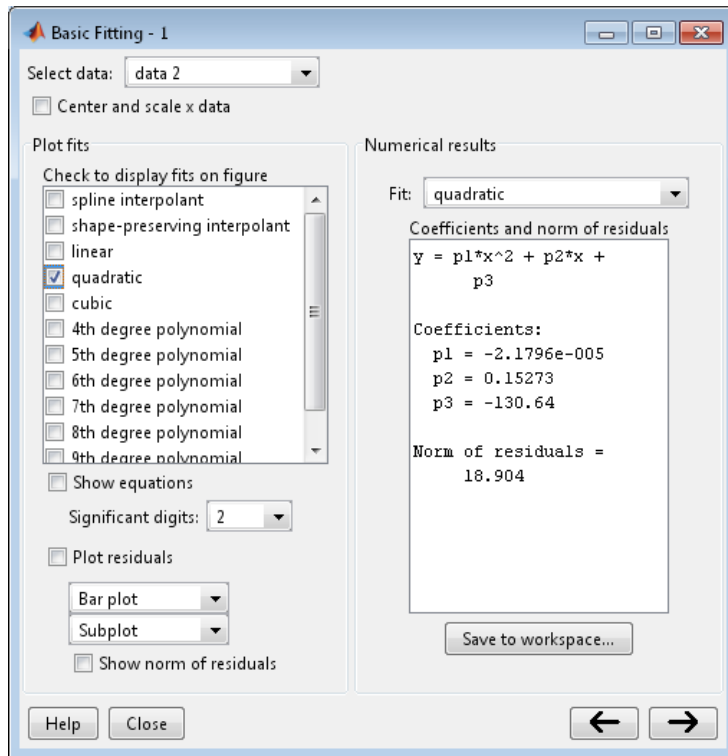
Közelítő függvények alkalmazása

Plot -> Tools -> **Basic fitting**



Közelítő függvények alkalmazása

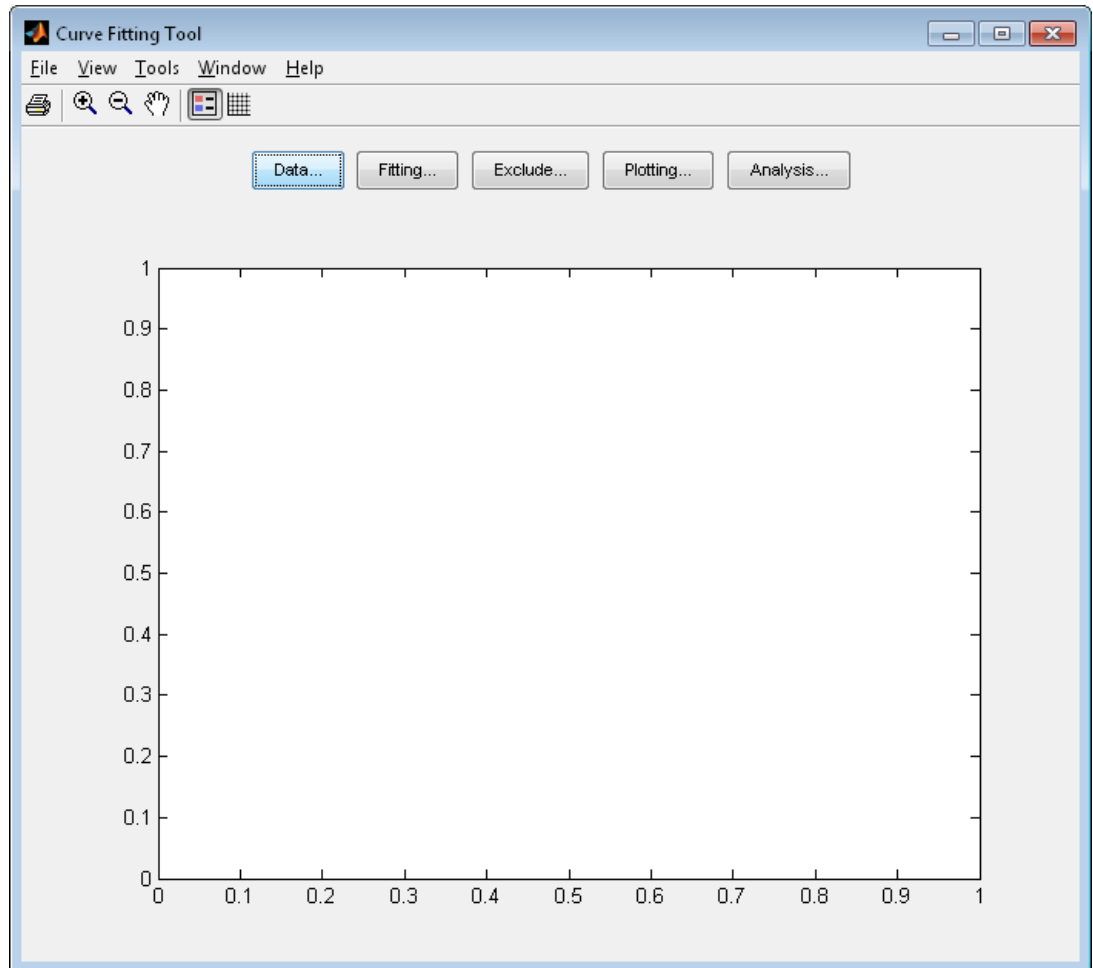
Plot -> Tools -> **Basic fitting**



Közelítő függvények alkalmazása

- **Curve Fitting Tool**

>> cftool



Közelítő függvények alkalmazása

```
x=airspeed(:,2)  
y=airspeed(:,1)  
cftool
```

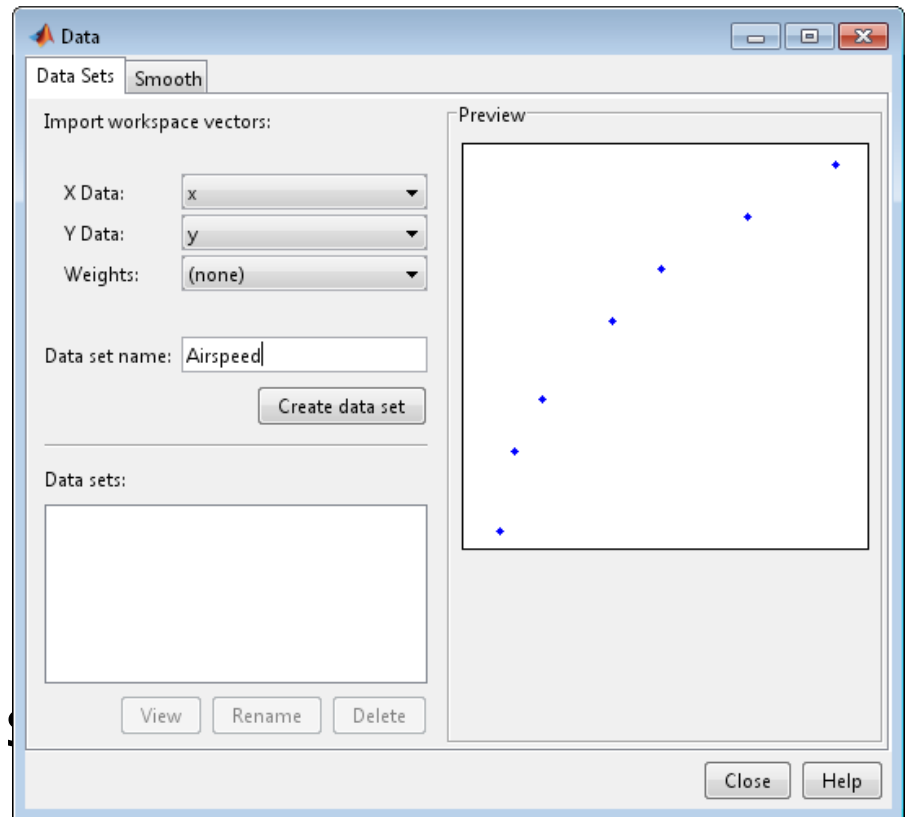
... •

X Data: x

Y Data: y

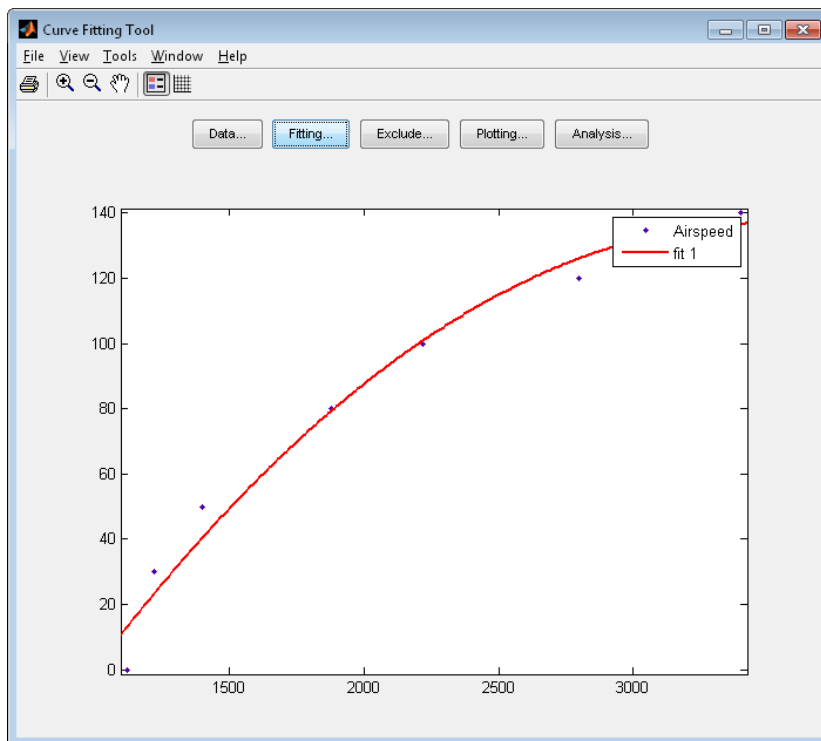
Data set name: Airspeed

-> Create data set



Közelítő függvények alkalmazása

Fitting



The Fitting Fit Editor window shows the configuration for the fit. The 'Type of fit' is set to 'Polynomial' (highlighted with a red circle). The 'Data set' is 'Airspeed'. The 'Fit name' is 'fit 1'. The 'Exclusion rule' is '(none)'. The 'Center and scale X data' checkbox is unchecked. The 'Polynomial' section lists the following options: linear polynomial, quadratic polynomial (selected), cubic polynomial, 4th degree polynomial, 5th degree polynomial, and 6th degree polynomial. The 'Fit options...' button is visible. The 'Immediate apply' checkbox is checked. The 'Results' section displays the following information:

Linear model Poly2:
 $f(x) = p1*x^2 + p2*x + p3$
Coefficients (with 95% confidence bounds):
p1 = -2.18e-005 (-4.142e-005, -2.174e-006)
p2 = 0.1527 (0.06502, 0.2404)
p3 = -130.6 (-217.7, -43.53)

Goodness of fit:
SSE: 357.4
R-square: 0.9764
Adjusted R-square: 0.9647
RMSE: 9.452

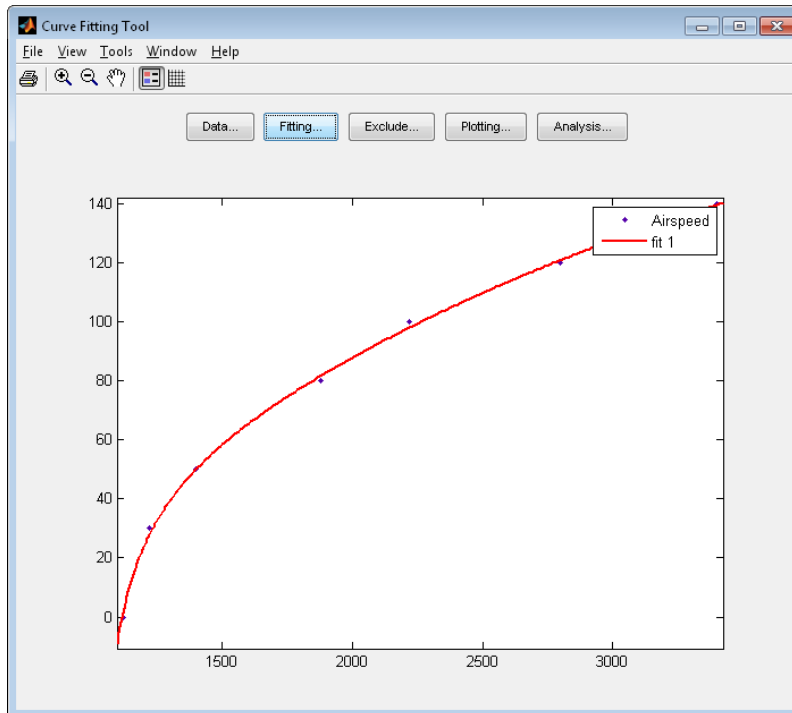
The 'Table of Fits' section shows the following table:

Fit name	Data set	Equation name	SSE	R-sq...
fit 1	Airspeed	Poly2	357.36024576670354	0.976...

Buttons: Delete fit, Save to workspace..., Table options..., Close, Help.

Közelítő függvények alkalmazása

Fitting



The Fitting Fit Editor window shows the configuration for a Rational fit. The 'Data set' is 'Airspeed' and the 'Type of fit' is 'Rational'. The 'Rational' fit options are shown, with the '4th degree polynomial' selected for both the Numerator and Denominator. The 'Fit options...' button is visible. The 'Results' section displays the general model equation and coefficients.

Fit Editor

New fit Copy fit

Fit name: fit 1

Data set: Airspeed Exclusion rule: (none)

Type of fit: Rational Center and scale X data

Rational

Numerator	Denominator
linear polynomial	linear polynomial
quadratic polynomial	quadratic polynomial
cubic polynomial	cubic polynomial
4th degree polynomial	4th degree polynomial
5th degree polynomial	5th degree polynomial

Fit options... Immediate apply Cancel Apply

Results

General model Rat42:

$$f(x) = \frac{(p1*x^4 + p2*x^3 + p3*x^2 + p4*x + p5)}{(x^2 + q1*x + q2)}$$

Coefficients:

p1 = -5.47e-006
p2 = 0.06851
p3 = -69.68
p4 = -5.607
p5 = 0.8115
q1 = -966.2
q2 = 3.967

Goodness of fit:

SSE: 15.08
R-square: 0.999
Adjusted R-square: NaN
RMSE: NaN

Table of Fits

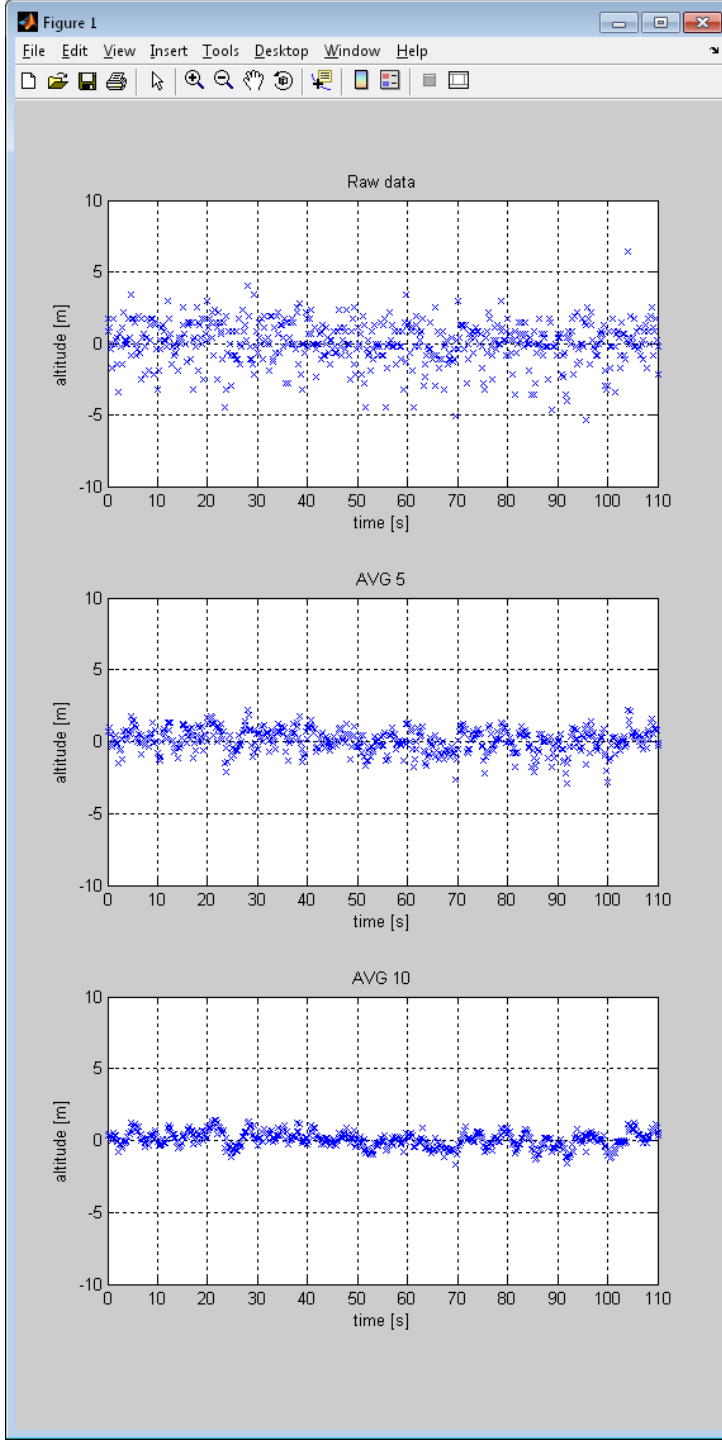
Fit name	Data set	Equation name	SSE	R-square
fit 1	Airspeed	Rat42	15.076115431048578	0.999006...

Delete fit Save to workspace... Table options...

Close Help

Jelek szűrése

- Átlagolás
- Medián szűrés
- Csúszó ablakos szűrés
- Stb...



Számábrázolási hibák

- Lebegő pontos vs. Fix pontos

```
x = [-5:0.001:5];  
y=sin(x)*5;  
subplot(2,1,1);  
plot(x,y);  
Grid;  
ylim([-6, 6]);  
subplot(2,1,2);  
plot(x,int32(y));  
Grid;  
ylim([-6, 6]);
```

