Lecture 3: Graphics

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Why Graphics in Matlab:

- Too powerful!
- Easy to use
- More flexible than Stata

Graphical User Interface (GUI):

- For beginners
  - Choose variables
  - Click plot type to generate plot
  - Edit plot in GUI

Command Line Graphics:

- Easy to replicate/edit
- Large sink cost
- Best practice: use GUI to generate code

2D Plots:

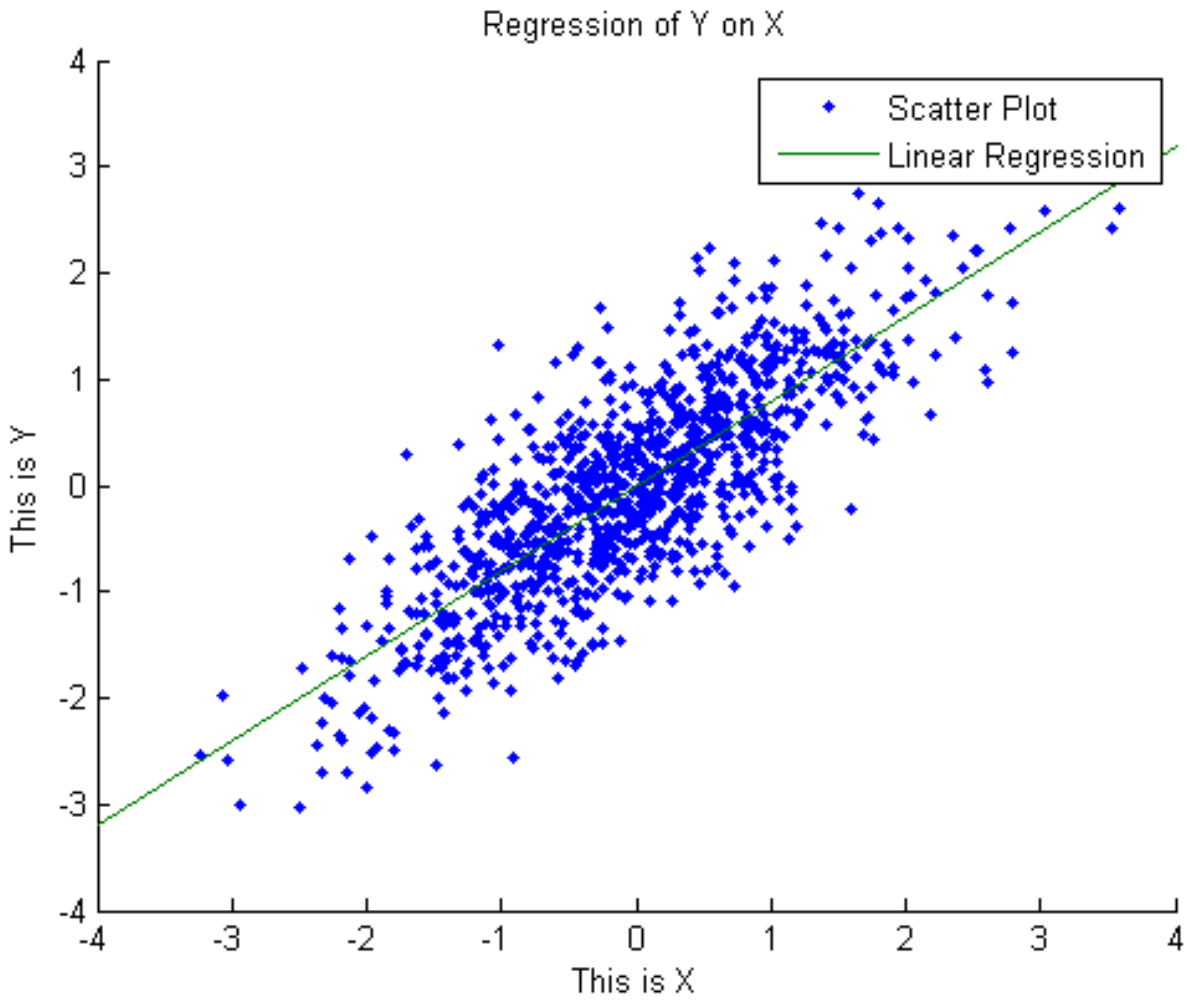
- Refer to manual for suitable plot types
- plot(x,y)
- scatter(x,y,s,c)
- hold all

2D Plots:

- Example:

```
a = mvnrnd([0 0],[1 0.8;0.8 1],1000);
x = a(:,1);
y = a(:,2);
scatter(x,y,[],'.')
hold all
plot([-4 4],[-3.2 3.2])
```

2D Plots:


Regression of Y on X
Scatter Plot
Linear Regression
This is Y
This is X
4
3
2
1
0
-1
-2
-3
-4
-4
-3
-2
-1
0
1
2
3
4

Graph Editing:

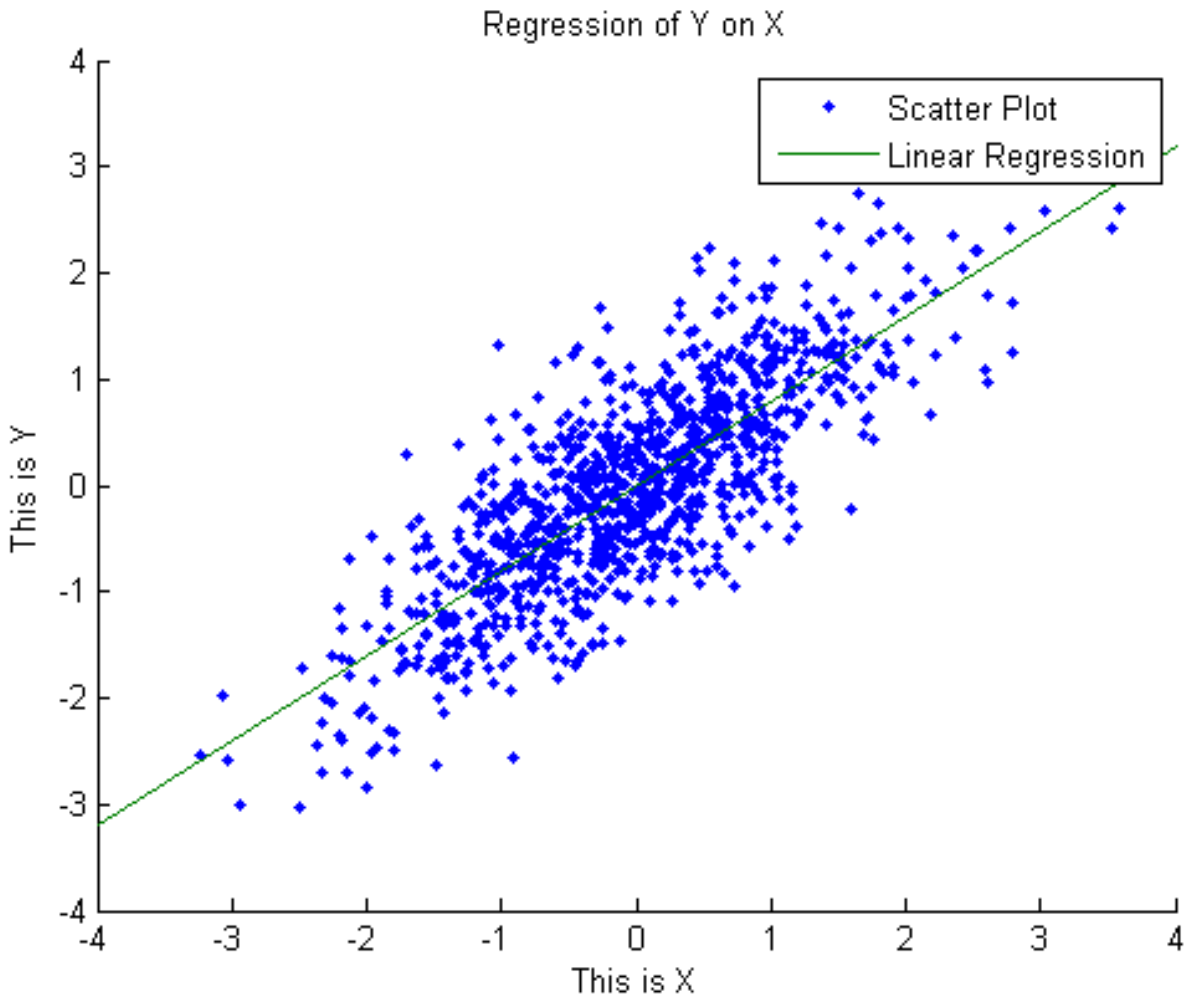
- title: adds title
- xlabel/ylabel/zlabel: adds x/y/z labels
- legend: adds legends to plots
- colorbar: showing color scale

Graph Editing:

- Example:

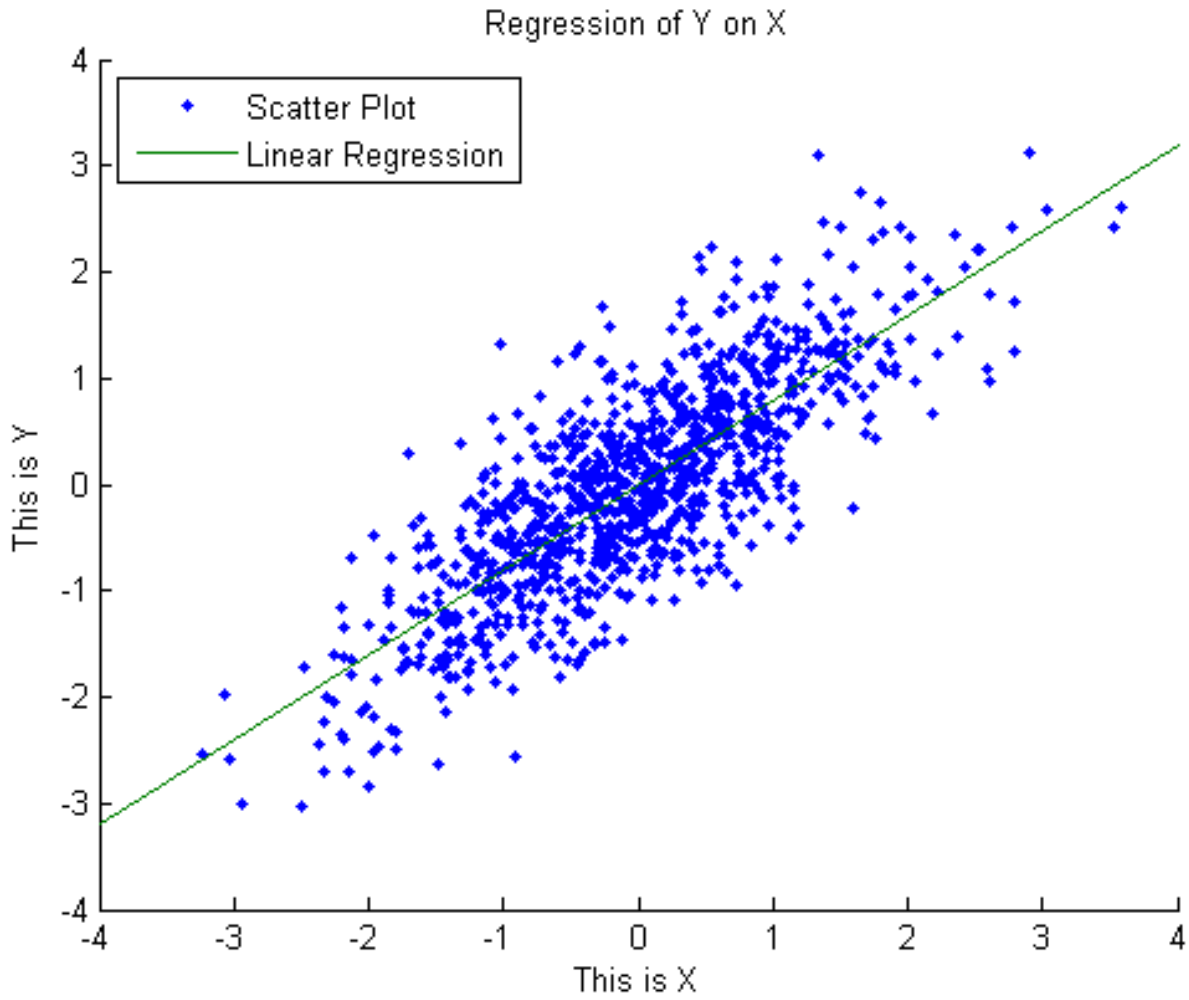
```
title('Regression of Y on X')
xlabel('This is X')
ylabel('This is Y')
legend('Scatter Plot', 'Linear Regression')
```

Graph Editing:



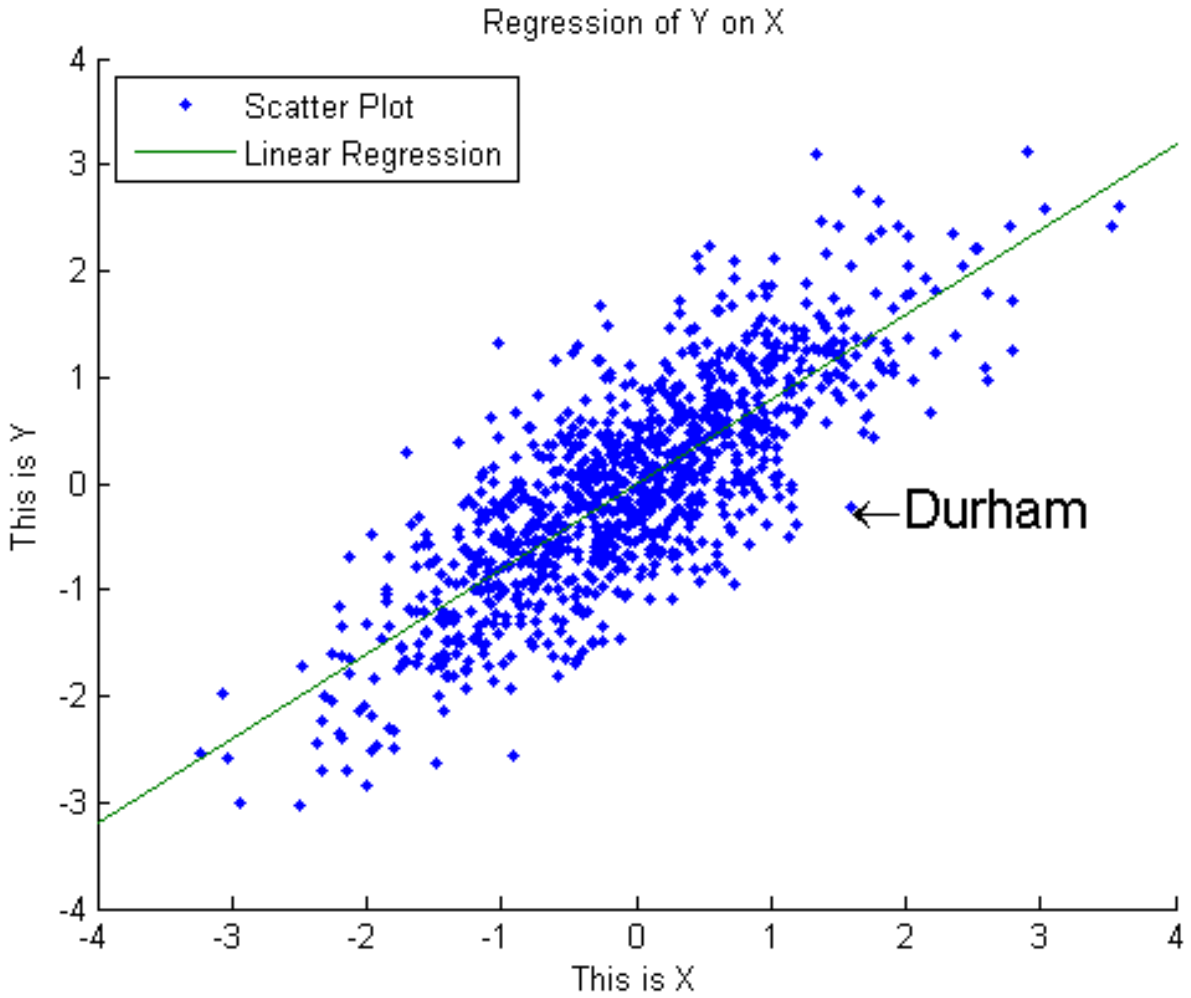
Graph Editing:

- legend('Scatter Plot', 'Linear Regression','location','NorthWest')



Adding Text and Arrows:

- text(1.588,-0.2296,'\leftarrowDurham','Fontsize',16)



Misc.:

- Save:

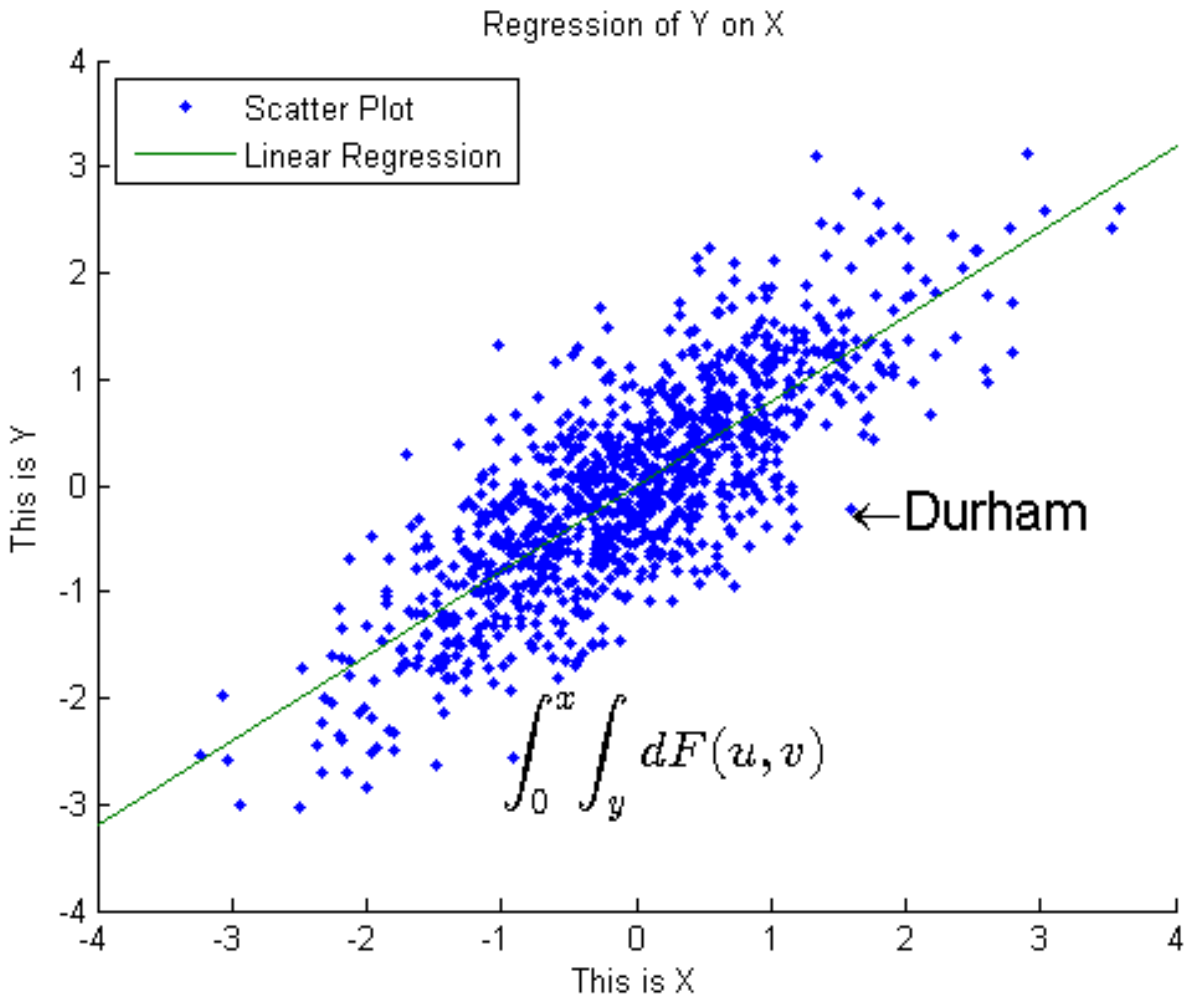
```
f1 = figure;
(main code)
print(f1,'fig_name','-dpng');
```

- TEX expression:

```
text('Interpreter','latex',...
'String','$$\int_0^x\!\int_y dF(u,v)$$',...
'Position',[-1 -2.573],...
'FontSize',16)
```

- Refer to online documentation for further information
- Generate code from GUI

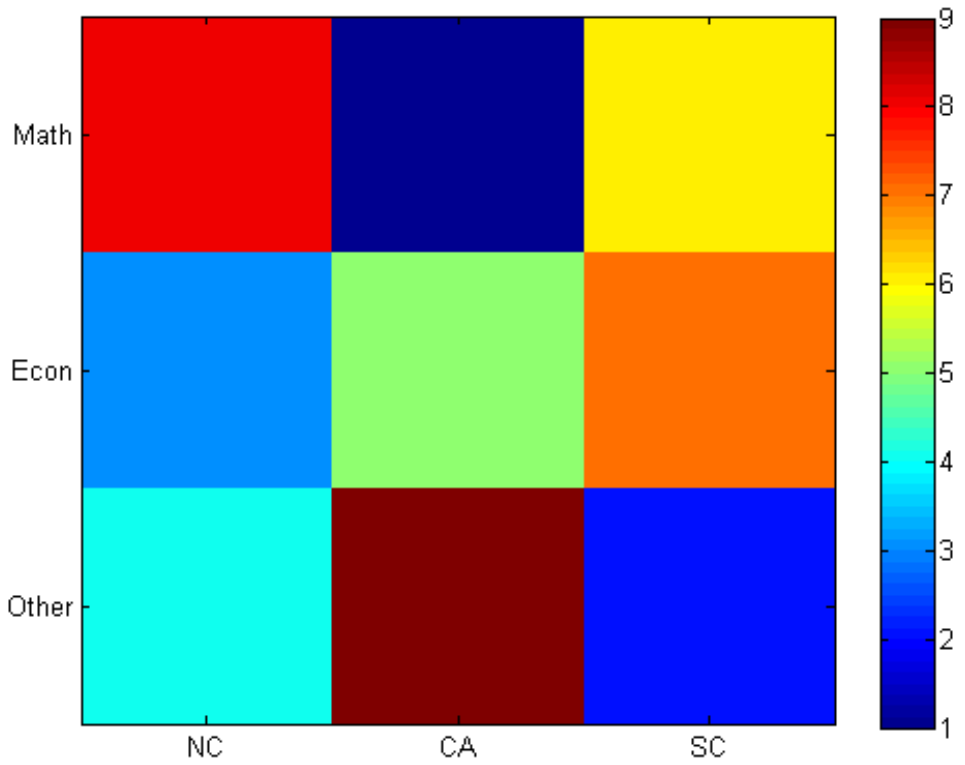
Misc.:


Regression of Y on X
Scatter Plot
Linear Regression
This is Y
This is X
←Durham
$\int_0^x \int_y dF(u,v)$
4
3
2
1
0
-1
-2
-3
-4
-4
-3
-2
-1
0
1
2
3
4

Misc.:

- label axis:

```
imagesc(magic(3)); colorbar;
set(gca,'Xtick',1:3,'XTickLabel',{'NC','CA','SC'})
set(gca,'ytick',1:3,'YTickLabel',{'Math','Econ','Other'}
```



3D Plots:

- [X Y] = meshgrid(x,y);
- [X Y] = ndgrid(x,y);
  - generate 2D grid points
  - Beware of ordering
- You can adjust view in GUI, then use generate code

3D Plots:

- Surf(x,y,z)

```
[x y z] = peak(25); surf(x,y,z);
```

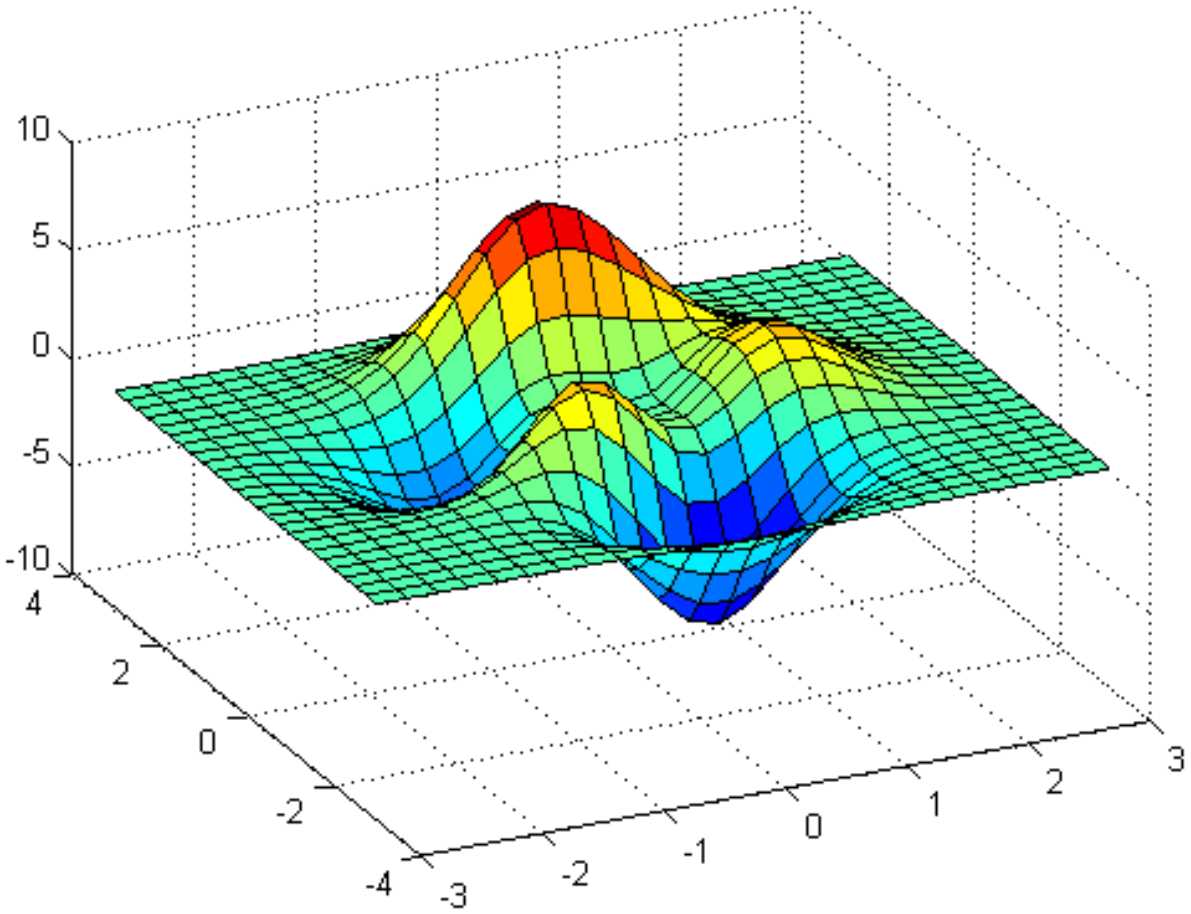
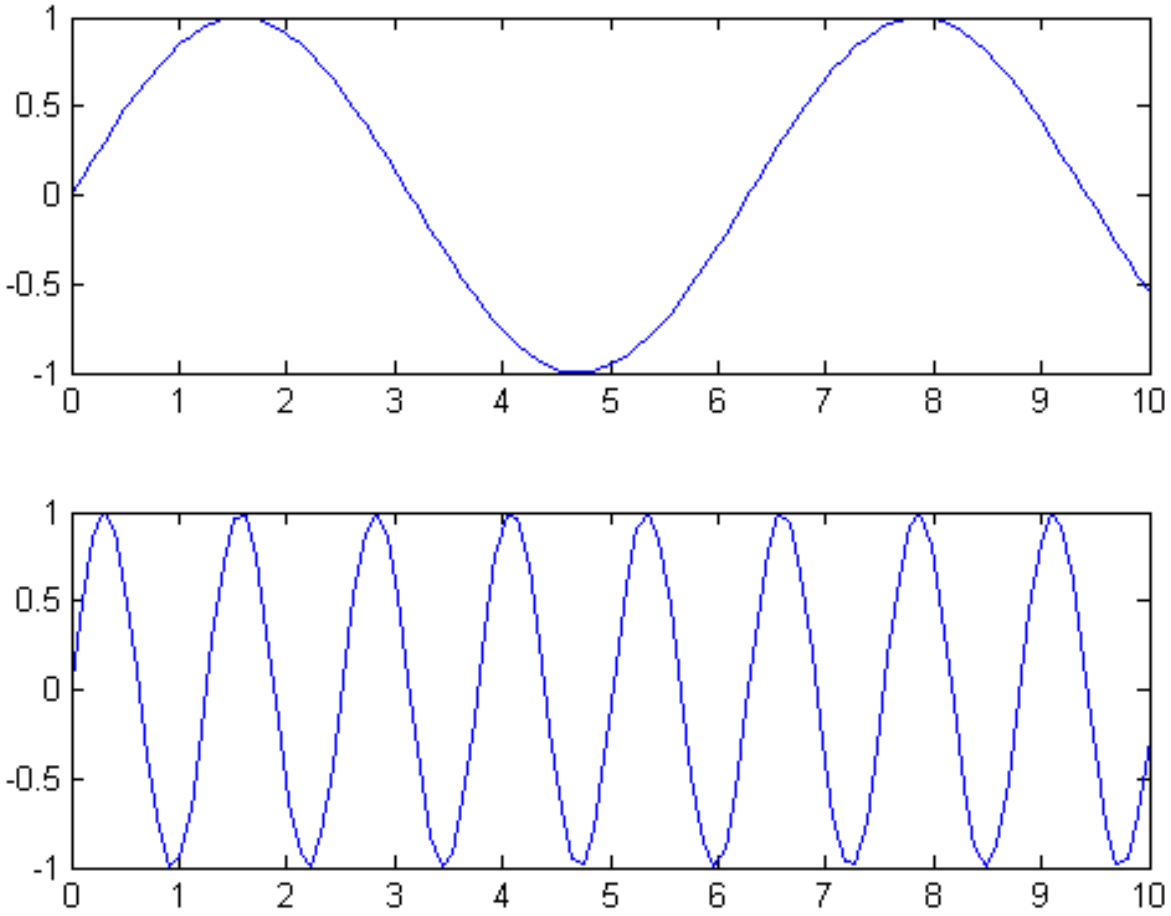


Figure and Subplot

- Group multiple plots into one figure

```
f1 = figure;
subplot(1,2,1)
plot(x,y);
subplot(1,2,2)
scatter(x1,y1);
```

Figure and Subplot



Resources

- Matlab Guide:
  http://courses.washington.edu/css485/graphg.pdf
- Trendy example plots:
  http://www.mathworks.com/matlabcentral/trendy/plots