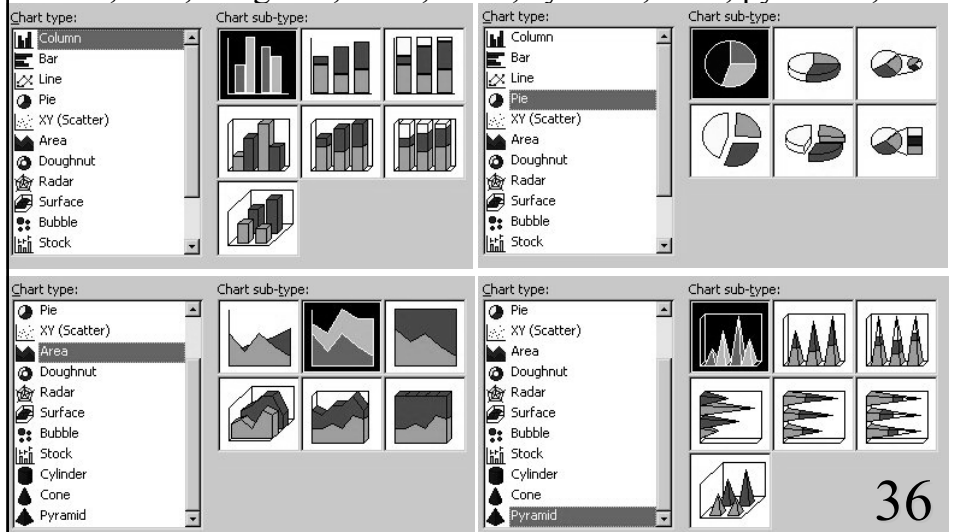


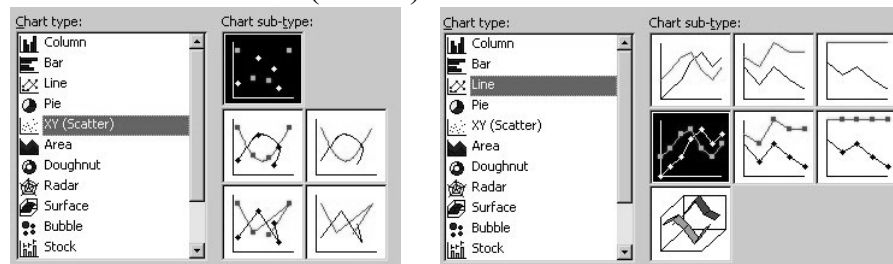
## Charts (Graphs):

- Charts are ways to display data in a graphical way.
  - Excel offers various types of charts, such as column, bar, pie, XY, area, doughnut, radar, stock, cylinder, cone, pyramids,...

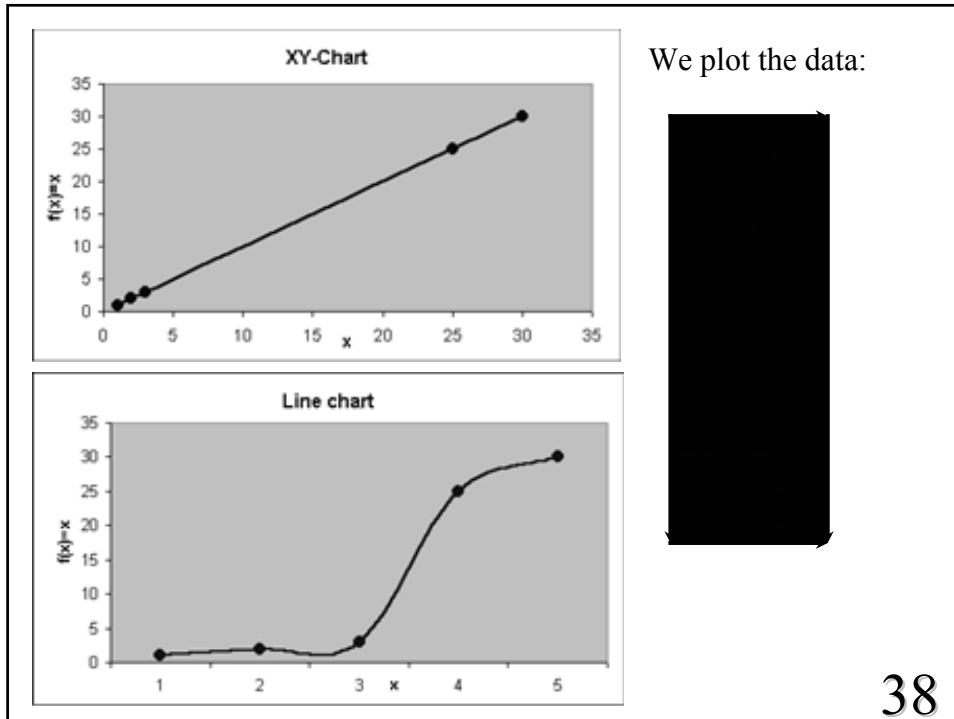


- Here we want to learn more about the most common types:

### XY-charts (scatter) and line charts.



- XY charts are used to plot ordered pairs of numerical data, e.g. from a scientific experiment, mathematical functions, etc.
- Line charts are used when the x-values are textual, e.g. month of the year, names of people or companies, places, etc.
- These two types of charts should not be confused with each other, as their display is quite different, which is not suggested by their names
- Example:



1) Creating an XY/line chart:

- i) open a worksheet
- ii) select the data you wish to display, e.g. cells A1:B30
  - in particular we want to see here how to plot a function  $f(x)$ , e.g. the  $x$  are in A1:A30 and the  $f(x)$  in B1:B30
- iii) open the chart wizard  $\Rightarrow$  a series of 4 dialog boxes open up

Chart Wizard - Step 1 of 4 - Chart Type

Standard Types | Custom Types

Chart type:

- Column
- Bar
- Line
- Pie
- XY (Scatter)
- Area
- Doughnut
- Radar
- Surface
- Bubble
- Stock

Chart sub-type:

Scatter with data points connected by smoothed Lines without markers.

Press and Hold to view Sample

Cancel < Back Next > Finish

- specify the type and the sub-type of the chart
- $\rightarrow$  Next ↵

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	A	B	C	D	E	F	G	H	I	J
1	x	cos(x)Exp(-x)	Trigonometric functions							
2	0	1								
3	0.1	0.900317								
4	0.3	0.707730678								
5	0.5	0.53228073								
6	0.7	0.37980939								
7	0.9	0.252727753								
8	1.1	0.150989033								
9	1.3	0.072901935								
10	1.5	0.015783603								
11	1.7	-0.023537766								
12	1.9	-0.048353974								
13	2.1	-0.061821651								
14	2.3	-0.066800063								
15	2.5	-0.065761873								
16	2.7	-0.060758632								
17	2.9	-0.053425245								
18	3.1	-0.045010242								
19	3.3	-0.036421382								
20	3.5	-0.028278542								
21	3.7	-0.020968024								
22	3.9	-0.014694257								
23	4.1	-0.009526371								
24	4.3	-0.005438267								
25	4.5	-0.00234173								
26	4.7	-0.000112678								
27	4.9	0.00138888								
28	5.1	0.002304435								
29	5.3	0.002767212								
30	5.5	0.002896171								
31	5.7	0.00279292								
32	5.9	0.002540776								
33	6.1	0.002205341								
34	6.3	0.001836045								

**Source Data**

Data Range:

Series in:  Rows  Columns

Buttons: Cancel, < Back, Next >, Finish

• verify that the data range selected in ii) is ok → Next ↵

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**Chart Wizard - Step 3 of 4 - Chart Options**

Chart title:

Value (X) axis:

Value (Y) axis:

Buttons: Cancel, < Back, Next >, Finish

**Chart Wizard - Step 3 of 4 - Chart Options**

Value (X) axis:  Major gridlines  Minor gridlines

Value (Y) axis:  Major gridlines  Minor gridlines

Buttons: Cancel, < Back, Next >, Finish

• specify the titles, axes, gridlines, legend, etc → Next ↵

**Chart Wizard - Step 4 of 4 - Chart Location**

Place chart:

As new sheet:

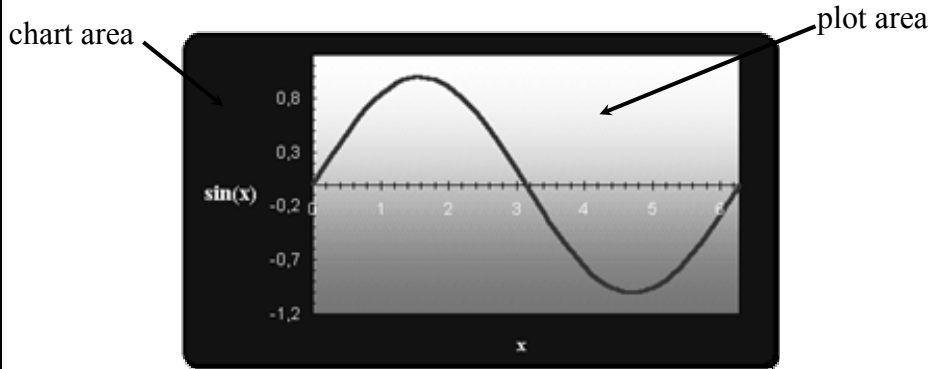
As object in:

Buttons: Cancel, < Back, Next >, Finish

• specify the location where the chart should stored → Finish ↵  
 ⇒ a chart will appear in the location you specified

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- For instance, if in some column (row) we had had some (densely enough) distributed x-values and in some other column (row) the corresponding values  $\sin(x)$ , we could have produced



- Most likely the design would not have been of this type, therefore →

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## 2) Modifying a chart:

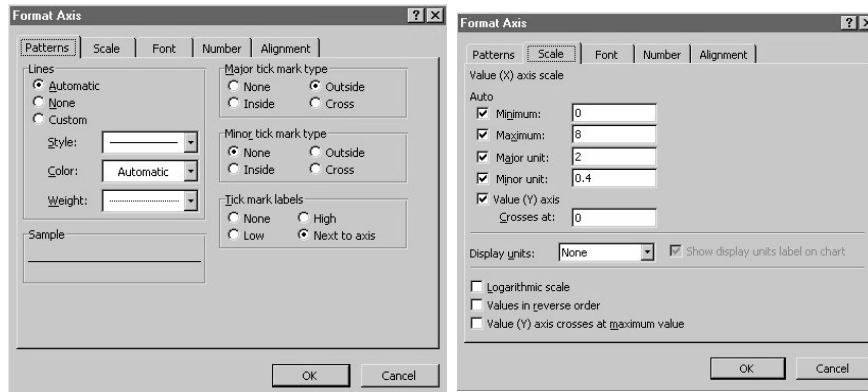
- you can change the design of the presentation by selecting the objects you wish to modify
- i) Formatting the plot area
  - by default the plot area will be grey
  - select the plot area  $\Rightarrow$  the “Format Plot Area“ window opens
  - use it to change the colours of the background, frame, etc.
- ii) Formatting the data series
  - select the line  $\Rightarrow$  the “Format Data Series“ window opens
  - use it to change the line pattern, data labels, error bars etc.



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### iii) Formatting the axis

- select the axis  $\Rightarrow$  the “Format Axis“ window opens
- use it to change the axis pattern and scale



### iv) Modifying the chart options

- right click the chart area  $\Rightarrow$  Chart Options  $\downarrow$
- use it to change titles, axes properties, gridlines, legends and data labels

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### v) Dynamical titles and axis labels

- the data are already linked in a dynamical way to the chart, this means if you change them the plot will change as well
- you can also do this with the title and axis labels
  - type some text into a cell, e.g. “sin(x)“ into F1
  - select the title or an axis label
  - type “=“ into the Formular bar
  - select again the cell where you wrote the text, e.g. F1 $\Rightarrow$  in the Formular bar the location of your text appears, e.g. =Sheet1!F1
  - select the “ $\checkmark$ “ to complete the process $\Rightarrow$  Now, whenever you update the selected cell, e.g. F1, the text inside the chart will change accordingly

### vi) Changing the default setting

- you might have a preferred chart style and if you do not want to repeat the previous steps use this style as default
- select the chart  $\rightarrow$  Chart  $\rightarrow$  Chart type  $\downarrow$  Select as default  $\downarrow$

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### 3) Data input:

- There are various ways to fill in the cells with data:
  - i) You can fill in the data the pedestrian way by just typing them
  - ii) The data might be stored externally on some file resulting for instance as output from another program.
    - Importing the data:
      - select a cell on your worksheet for the first value
      - select Data → Get External → Import Text File ↵
      - ⇒ Text Import Wizard opens with a series of 3 dialog boxes
        - answer questions about data and file type
        - modify the field width
        - select the data format → Finish ↵
      - confirm the location where the data should be stored
    - iii) Use the fill function (see lecture on Macros)
    - iv) Use a VBA program to fill in the data
      - see for instance Lab-session 1, task 4

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### v) Use the autofill function

- The autofill function determines automatically the entries of some cells given some starting values:
  - fill in some starting values
    - e.g. 0 →A1, 0.1 →A2, =SIN(A1) →B1, =SIN(A2) →B2
  - select the area of the starting values, e.g. A1:B2
  - while you are on top of the selected area the cursor will be **+**
  - move the cursor to the lower right corner of the selection, until the cursor changes from **+** to **+**
  - drag the fill handle down (or to the right) and the new cells will be filled based on the initial selection, e.g. 0.2 →A3, 0.3 →A4, =SIN(A3) →B3, =SIN(A4) →B4, etc.
  - verify that Excel really filled in the sequence you wanted!!!
- ⇒ In our example we have now two column of data, which we can plot against each other in the chart

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4) Data handling:

- ▶ Adding data to an existing chart:
  - plot area → Source data → Series → add → X/Y values, name → Ok ↵
- ▶ Data → sort ≡ arrange selected data alphabetically, by data or numerically in ascending or descending order
- ▶ Data → filter ≡ allows to filter out certain data based on their location
- ▶ Data → validation ≡ allows to filter certain data based on a criterion you define, e.g. a certain range
- ▶ Data → subtotals ≡ computes totals and subtotals for selected columns and inserts them into the sheet
- ▶ Data → text to columns ≡ allows to change the data type