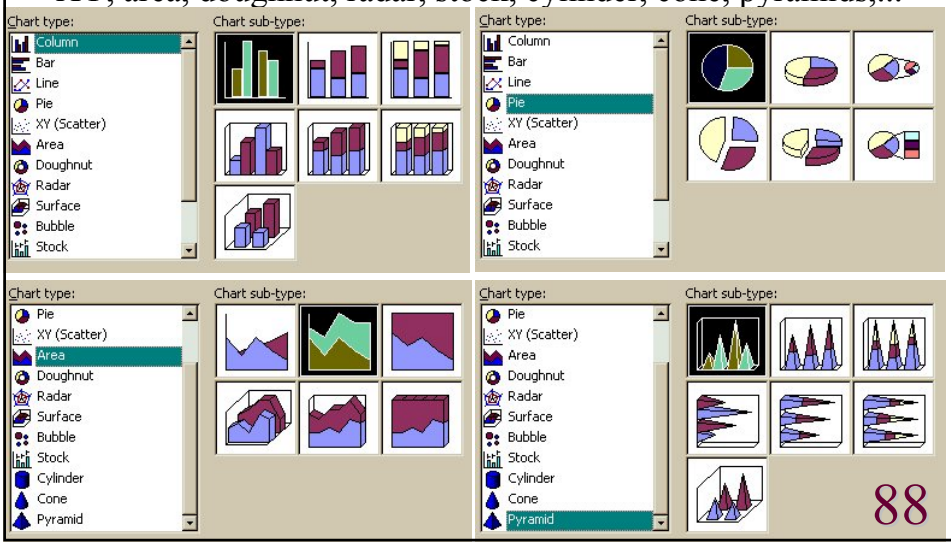
Charts (Graphs):

• 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,...



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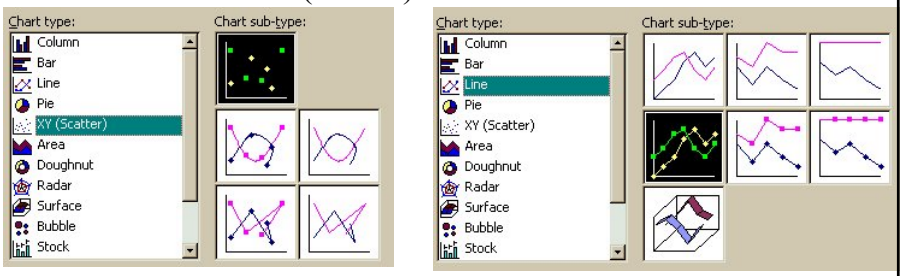
- Here we want to learn more about the most common types: XY-charts (scatter) and line charts.



- 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:

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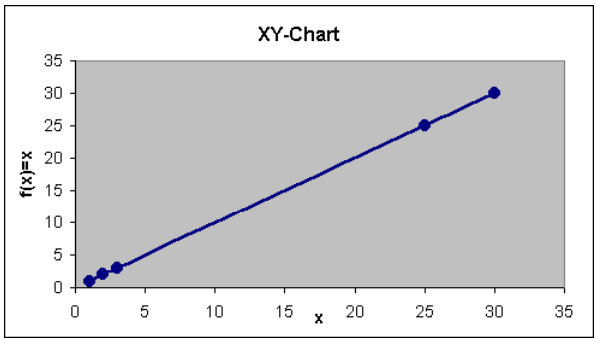
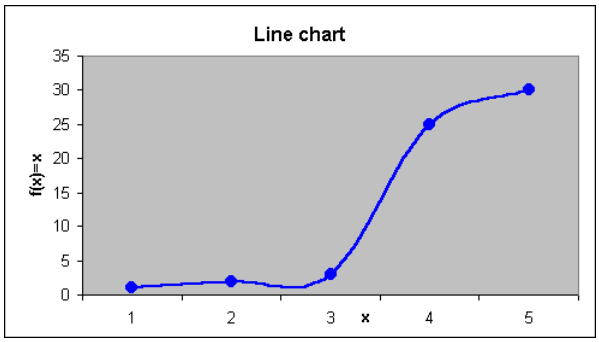




We plot the data:

x	f(x)
1	1
2	2
3	3
25	25
30	30

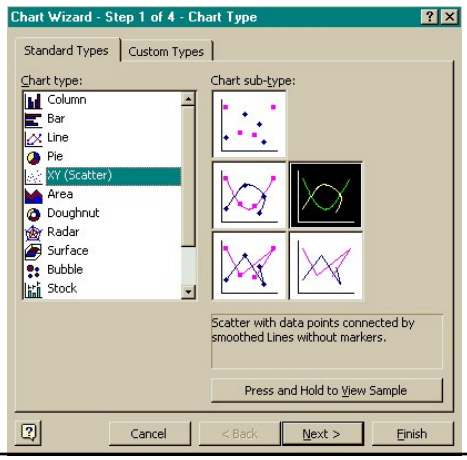
1) Creating an XY/line chart:

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 ⇒ a series of 4 dialog boxes open up



• specify the type and the sub-type of the chart

→ Next ↵

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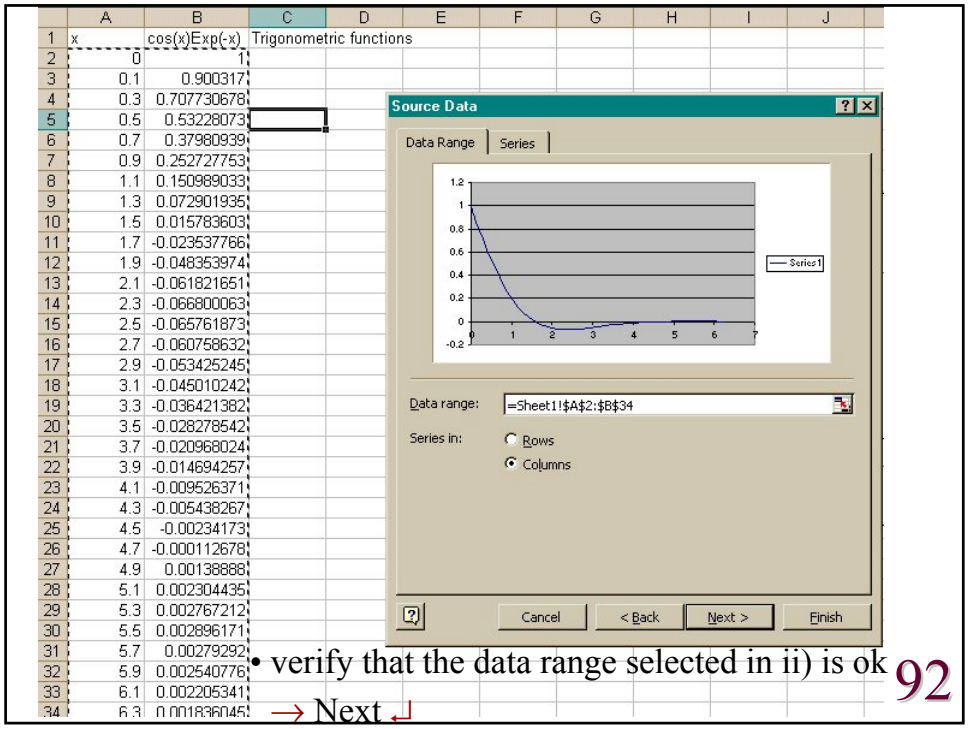
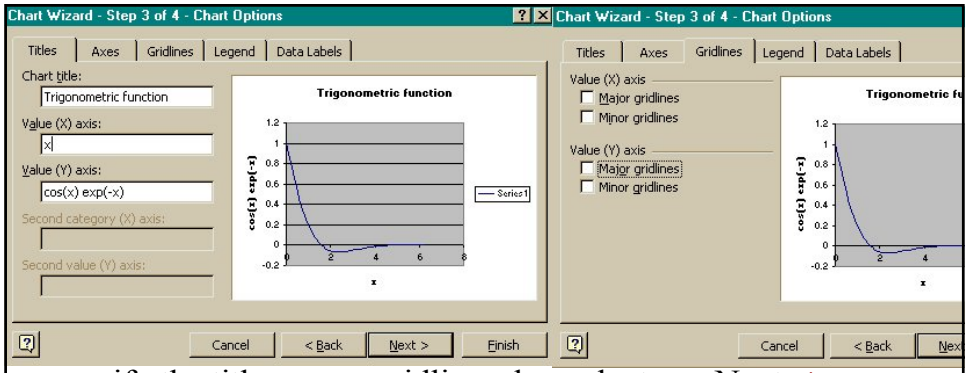
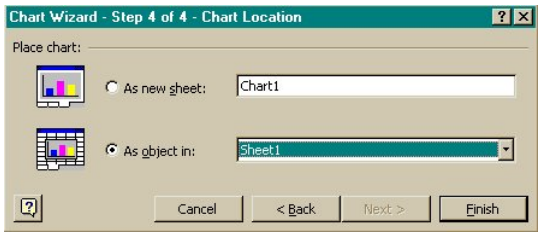


• verify that the data range selected in ii) is ok → Next ↵ 92

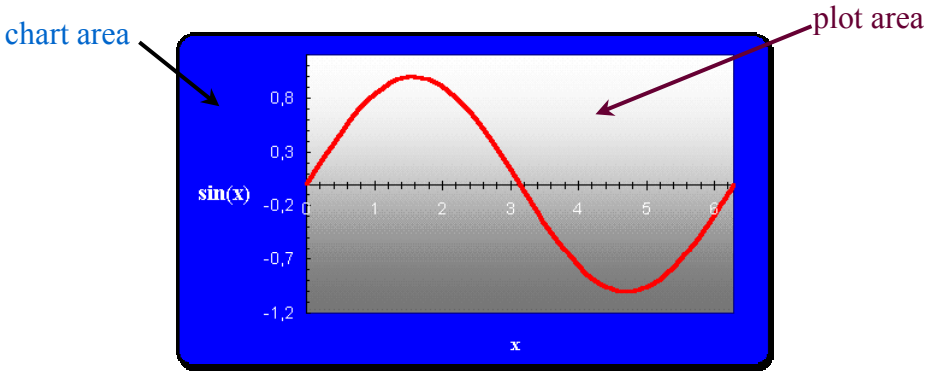


• specify the titles, axes, gridlines, legend, etc → Next ↵



• specify the location where the chart should stored→ Finish ↵ 93
⇒ a chart will appear in the location you specified

• 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:

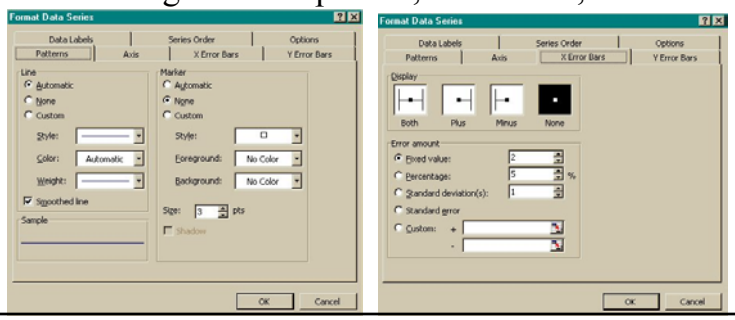
• you can change the design of the presentation by selecting the objects you wish to modify

i) Formatting the plot area

- by default the plot area will be grey
- select the plot area ⇒ 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 ⇒ the "Format Data Series" window opens
- use it to change the line pattern, data labels, error bars etc.



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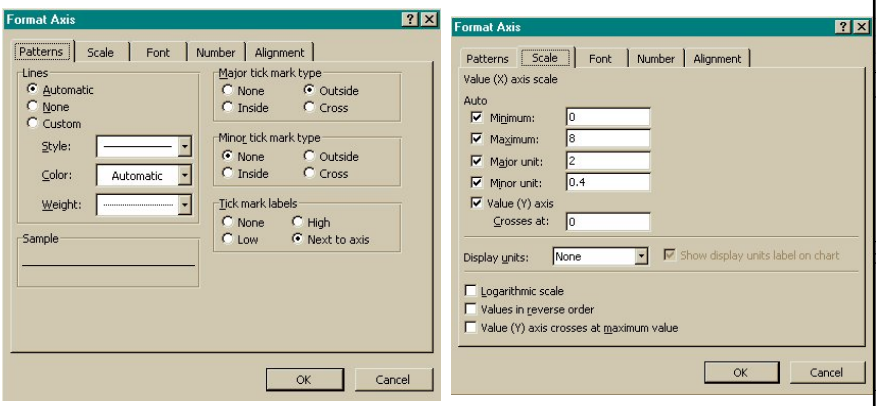
iii) Formatting the axis
- select the axis ⇒ the "Format Axis" window opens
- use it to change the axis pattern and scale



iv) Modifying the chart options
- right select the chart area ⇒ Chart Options ↵
- 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
  ⇒ in the Formular bar the location of your text appears, e.g. =Sheet1!F1
  · select the "✓" to complete the process
  ⇒ 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 → Chart → Chart type ↵ Select as default ↵

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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 (recall page 17 and more see lecture on Macros in part II)

iv) Use a VBA program to fill in the data

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```
Sub fill()
Const pi = 2 * 3.1415
Range("a1").Value = 0 * pi
Range("a2").Value = 0.1 * pi
Range("a3").Value = 0.2 * pi
      ……..
Range("a10").Value = 0.9 * pi
Range("a11").Value = pi
Range("b1").Value = f(Range("a1").Value)
Range("b2").Value = f(Range("a2").Value)
      ……
Range("b10").Value = f(Range("a10").Value)
Range("b11").Value = f(Range("a11").Value)
End Sub
```

```
Function f(x)
   f = Exp(-x) * Cos(x)
End Function
```

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v) Use the autofill function (recall from page 17)
- 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

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5) Curve fitting:

- see part II of the course

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