

# Polynomial fit

Created using Maple 14.01

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```
> restart;
with(StringTools) :
with(Statistics) :
with(plots) :
FormatTime("%m-%d-%Y, %H:%M");
"03-04-2013, 22:51"
```

(1)

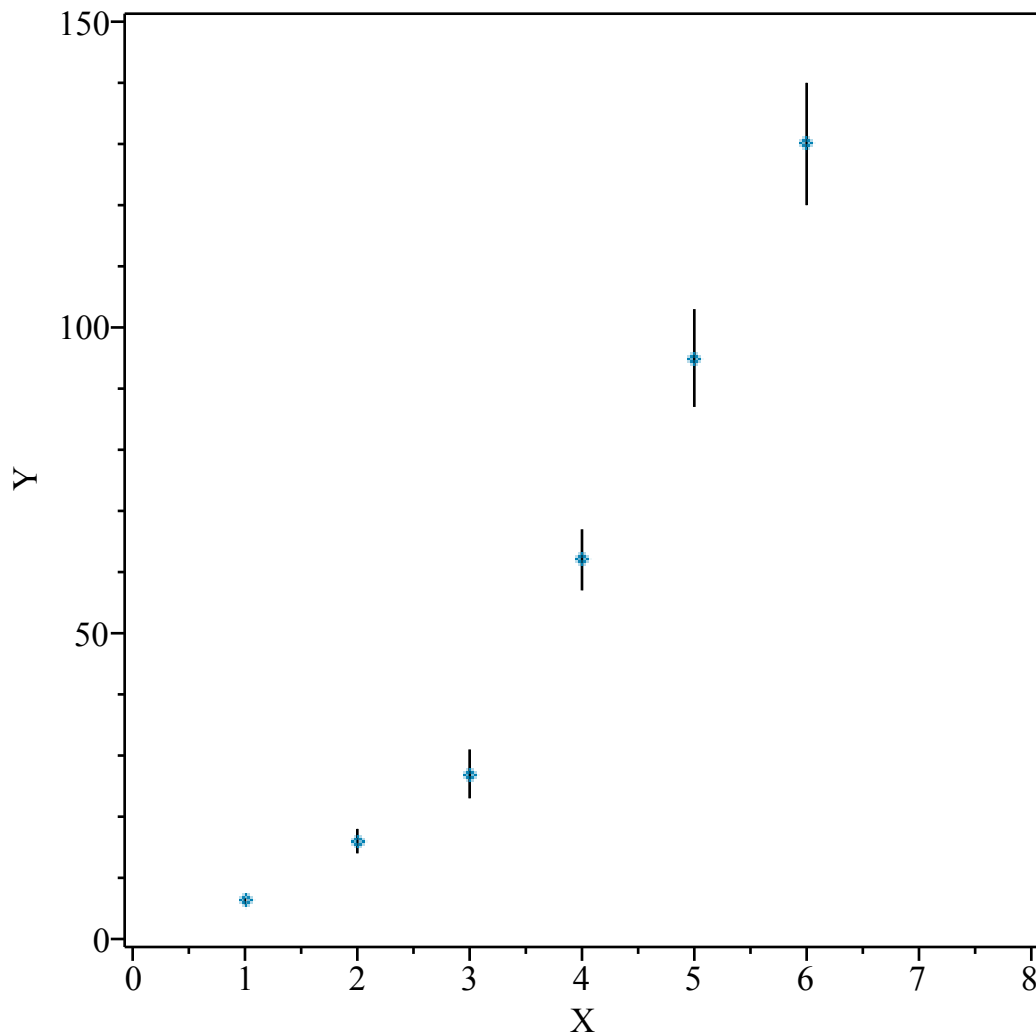
First, enter some data and uncertainties in the  $y$ -values.

```
> X := [1, 2, 3, 4, 5, 6];
Y := [6.2, 16, 27, 62, 95, 130];
errY := [0.5, 2, 4, 5, 8, 10];
X := [1, 2, 3, 4, 5, 6]
Y := [6.2, 16, 27, 62, 95, 130]
errY := [0.5, 2, 4, 5, 8, 10]
```

(2)

Plot the data.

```
> dataPlot := ScatterPlot(X, Y, yerrors = errY, axes = boxed, view = [0 ..8, 0 ..150], labels
= ["X", "Y"], labeldirections = ["horizontal", "vertical"]) :
display(dataPlot);
```



Define the weighting as one over the square of the uncertainties.

$$\begin{aligned}
 > Yweights := \left[ seq\left( \frac{1}{errY[i]^2}, i = 1 .. nops(errY) \right) \right]; \\
 & \quad Yweights := \left[ 4.000000000, \frac{1}{4}, \frac{1}{16}, \frac{1}{25}, \frac{1}{64}, \frac{1}{100} \right]
 \end{aligned}
 \tag{3}$$

The *PolynomialFit* has the same form as the linear fit function. The first digit (2 in this example) defines the degree of the polynomial used in the fit.

$$\begin{aligned}
 > fcn := PolynomialFit(2, X, Y, y, weights = Yweights, output = [leastsquaresfunction, \\
 & \quad parametervalues, standarderrors]); \\
 fcn := & \left[ 5.64392992740904 - 3.60659446503969 y + 4.17411909268506 y^2, \right.
 \end{aligned}
 \tag{4}$$

```
[ 5.64392992740904  
-3.60659446503969  
4.17411909268506 ]
```

```
[ 2.87219778700273 3.33203048363167 0.636267737308750 ]
```

Plot the best-fit line on top of the data.

```
> fitPlot := plot(fcn[1], y=0..8) :  
display(dataPlot, fitPlot);
```

