# Lösungen / Statistik 2/05

```
Remove["Global`*"]
```

## 1.

Selbststudium

## 2.

```
f[x_, y_, z_] := E^(x^2 - y^2) + Tan[x - y^3] + 1 / Log[z]
```

```
f[4, 6, 2]
```

$$\frac{1}{e^{20}} + \frac{1}{\text{Log}[2]} - \text{Tan}[212]$$

```
N[%]
```

```
-15.9282
```

```
k = {x → 4, y → 6, z → 2}
```

```
{x → 4, y → 6, z → 2}
```

```
w = 0.02 * Abs[D[f[x, y, z], x] /. k] +
  0.03 * Abs[D[f[x, y, z], y] /. k] + 0.01 * Abs[D[f[x, y, z], z] /. k]
```

```
986.968
```

-15.928191816576632 +/- 986.9679423798987

## 3.

### a

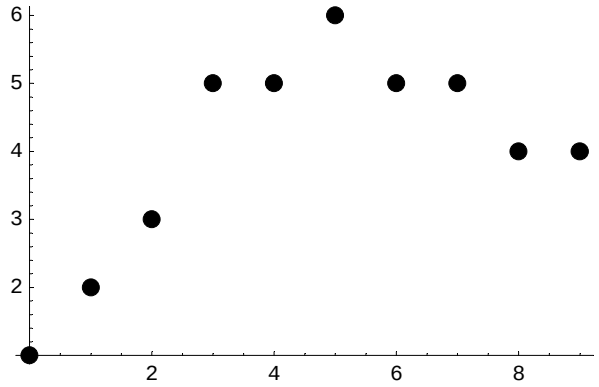
```
Remove["Global`@*"]
```

```
<< Statistics`LinearRegression`
```

```
m = {{0, 1}, {1, 2}, {2, 3}, {3, 5}, {4, 5}, {5, 6}, {6, 5}, {7, 5}, {8, 4}, {9, 4}}
```

```
{{0, 1}, {1, 2}, {2, 3}, {3, 5}, {4, 5}, {5, 6}, {6, 5}, {7, 5}, {8, 4}, {9, 4}}
```

```
dPlot = ListPlot[m, PlotStyle → {PointSize[0.03]}];
```




```
Remove[func]
```

```
Fit[m, {1, x}, x]
```

```
2.58182 + 0.315152 x
```

```
fu[x_] := Fit[m, {1, x}, x]
```

```
fu[x]
```

```
2.58182 + 0.315152 x
```

```
Fit[m, {1, x}, x]
```

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2.58182 + 0.315152 x
```

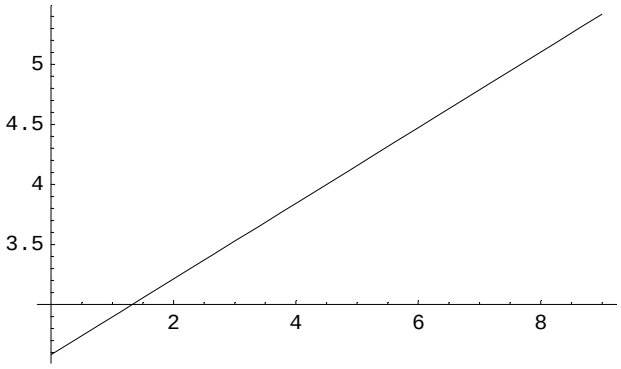
```
fu[x_] = Fit[m, {1, x}, x]
```

```
2.58182 + 0.315152 x
```

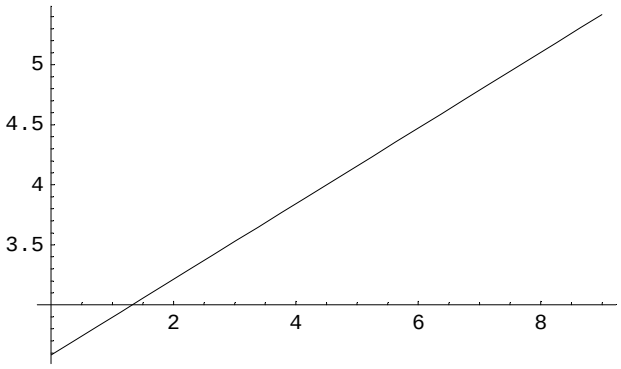
```
fu[x]
```

```
2.58182 + 0.315152 x
```

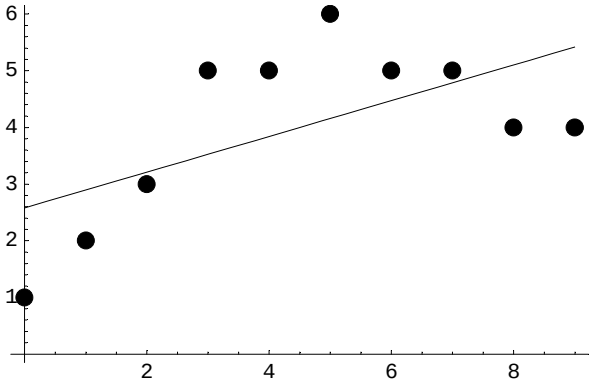
```
fPlot = Plot[fu[x], {x, 0, 9}];
```



```
fPlot = Plot[Evaluate[fu[x]], {x, 0, 9}];
```




```
Show[dPlot, fPlot];
```




```
Remove[fu1]
```

```
fuq[x_] := Fit[m, {1, x, x^2}, x]
```

```
fuq[x]
```

$$0.763636 + 1.67879\,x - 0.151515\,x^2$$

```
Fit[m, {1, x, x^2}, x]
```

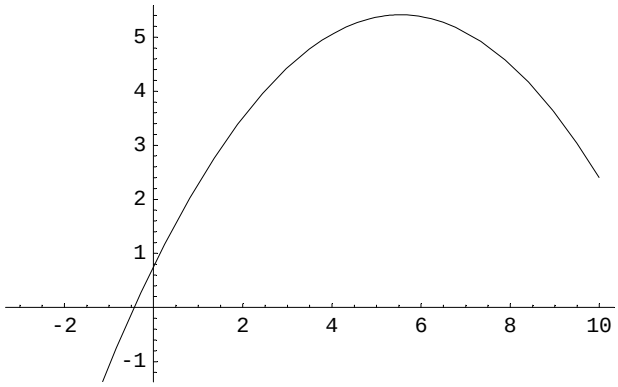
$$0.763636 + 1.67879\,x - 0.151515\,x^2$$

```
? fuq
```

```
Global`fuq

fuq[x_] := Fit[m, {1, x, x^2}, x]
```

```
fPlotq = Plot[Evaluate[fuq[x]], {x, -3, 10}];
```




So geht es nicht:

```
Plot[fuq[x], {x, -3, 10}];
```

```
General::ivar : -3. is not a valid variable. Mehr…

General::ivar : -3. is not a valid variable. Mehr…

General::ivar : -3. is not a valid variable. Mehr…

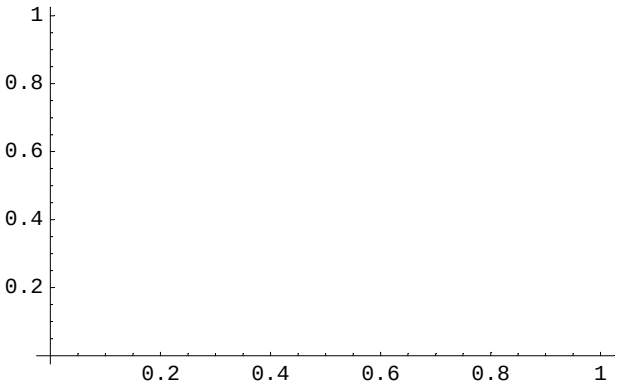
General::stop : Further output of General::ivar will be suppressed during this calculation. Mehr…

Plot::plnr : fuq[x] is not a machine-size real number at x = -3.. Mehr…

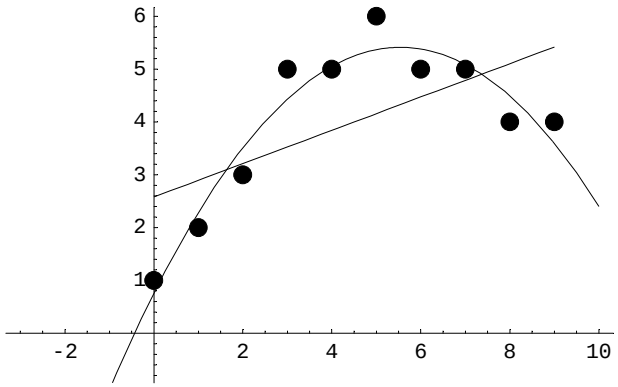
Plot::plnr : fuq[x] is not a machine-size real number at x = -2.47263. Mehr…

Plot::plnr : fuq[x] is not a machine-size real number at x = -1.89749. Mehr…

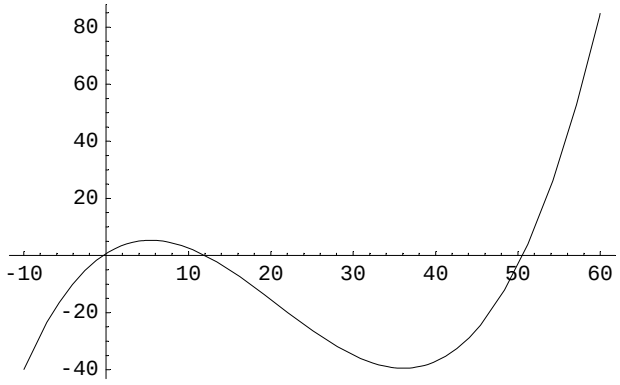
General::stop : Further output of Plot::plnr will be suppressed during this calculation. Mehr…
```




```
Show[dPlot, fPlot, fPlotq];
```



```
Plot[Evaluate[Fit[m, {1, x, x^2, x^3}, x]], {x, -10, 60}];
```

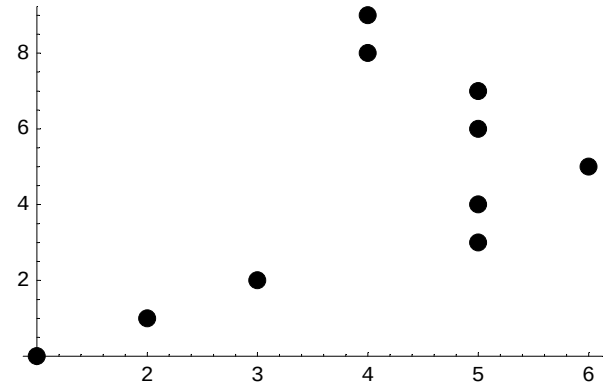



## b

```
m1 = Table[{m[[r]][[2]], m[[r]][[1]]}, {r, 1, Length[m]}]
```

```
{{1, 0}, {2, 1}, {3, 2}, {5, 3}, {5, 4}, {6, 5}, {5, 6}, {5, 7}, {4, 8}, {4, 9}}
```

```
dPlot1 = ListPlot[m1, PlotStyle → {PointSize[0.03]}];
```




```
Remove[func]
```

```
Fit[m1, {1, x}, x]
```

```
-0.227273 + 1.18182 x
```

```
fu1[x_] := Fit[m, {1, x}, x]
```

```
fu1[x]
```

```
2.58182 + 0.315152 x
```

```
Fit[m1, {1, x}, x]
```

```
-0.227273 + 1.18182 x
```

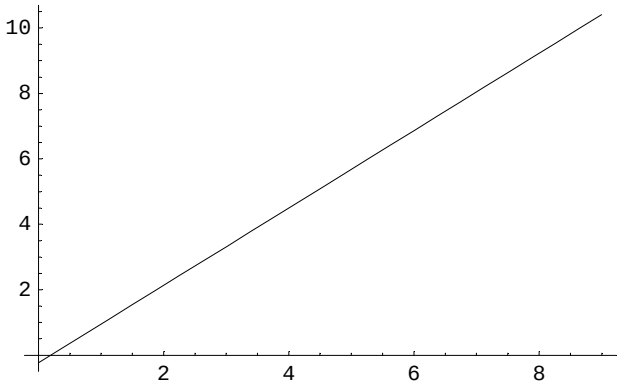
```
fu1[x_] = Fit[m1, {1, x}, x]
```

```
-0.227273 + 1.18182 x
```

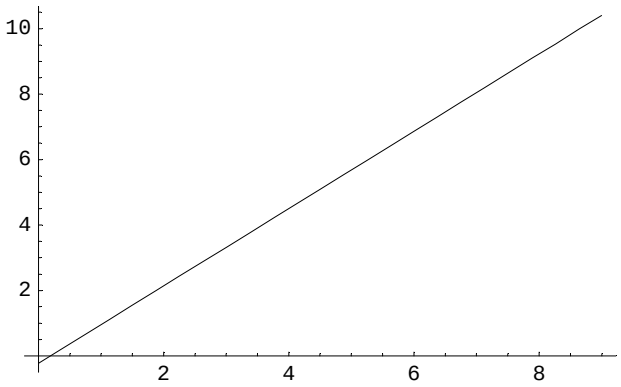
```
fu1[x]
```

```
-0.227273 + 1.18182 x
```

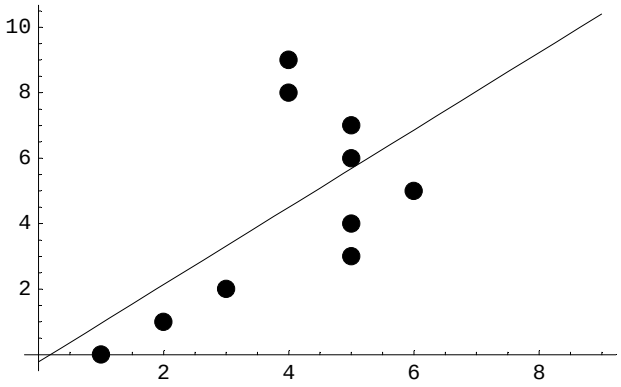
```
fPlot1 = Plot[fu1[x], {x, 0, 9}];
```




```
fPlot1 = Plot[Evaluate[fu1[x]], {x, 0, 9}];
```




```
Show[dPlot1, fPlot1];
```




```
Remove[fu1]
```

```
fuq1[x_] := Fit[m1, {1, x, x^2}, x]
```

```
fuq1[x]
```

$$-5.58166 + 5.10218\,x - 0.56742\,x^2$$

```
Fit[m1, {1, x, x^2}, x]
```

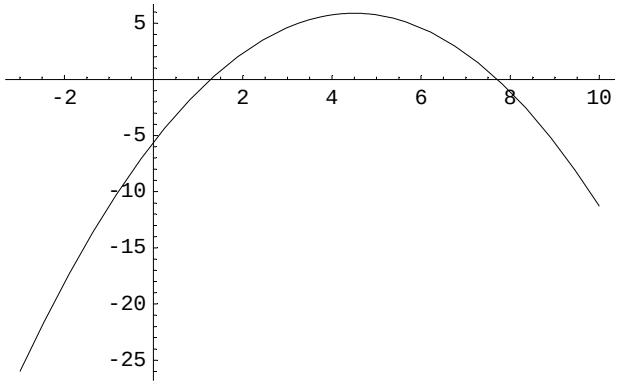
$$-5.58166 + 5.10218\,x - 0.56742\,x^2$$

```
? fuq1
```

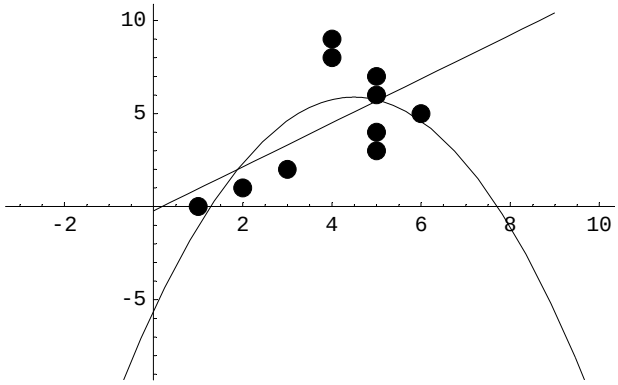
```
Global`fuq1
```

```
fuq1[x_] := Fit[m1, {1, x, x^2}, x]
```

```
fPlotq1 = Plot[Evaluate[fuq1[x]], {x, -3, 10}];
```




```
Show[dPlot1, fPlot1, fPlotq1];
```




## c

```
m11 = Table[m[[r]][[1]], {r, 1, Length[m]}]
```

```
{0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
```

```
m22 = Table[m[[r]][[2]], {r, 1, Length[m]}]
```

```
{1, 2, 3, 5, 5, 6, 5, 5, 4, 4}
```

```
<< Statistics`DescriptiveStatistics`
```

```
sxx = 1 / (Length[m] - 1) Sum[(m11[[k]] - Mean[m11])^2, {k, 1, Length[m]}]
```

$$\frac{55}{6}$$

```
syy = 1 / (Length[m] - 1) Sum[(m22[[k]] - Mean[m22])^2, {k, 1, Length[m]}]
```

$$\frac{22}{9}$$

```
sxy = 1 / (Length[m] - 1)
  Sum[(m11[[k]] - Mean[m11]) (m22[[k]] - Mean[m22]), {k, 1, Length[m]}]
```

$$\frac{26}{9}$$

```
r = sxy / Sqrt[sxx syy]
```

$$\frac{26}{11\sqrt{15}}$$

```
r // N
```

```
0.610288
```