

# Statistics II in English

## Exercises from *Übungsaufgaben und Lösungen zu Statistik I und II*

### Part 4

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**Exercise 9-1:**

In an overall analysis, 11 companies of a certain sector are assessed with respect to the dependency of the turnover  $Y$  (in million EUR) on investment  $X_1$  (in 1000 EUR), on expenditures for research and development  $X_2$  (in 1000 EUR) and on marketing expenditures  $X_3$  (in 1000 EUR) for a given time interval. The values of the explanatory variables  $X_1$ ,  $X_2$ ,  $X_3$  and of the  $Y$  are listed in the table.

i	$y_i$	$x_{i1}$	$x_{i2}$	$x_{i3}$
1	12,6	117,0	84,5	3,1
2	13,1	126,3	89,7	3,6
3	15,1	134,4	96,2	2,3
4	15,1	137,5	99,1	2,3
5	14,9	141,7	103,2	0,9
6	16,1	149,4	107,5	2,1
7	17,9	158,4	114,1	1,5
8	21,0	166,5	120,4	3,8
9	22,3	177,1	126,8	3,6
10	21,9	179,8	127,2	4,1
10	21,9	179,8	127,2	4,1

1. Determine the simple regression function of the turnover with respect to the investment, the R&D expenses and the marketing expenses, respectively and the corresponding coefficients of determination.
2. Calculate all simple linear correlation coefficients between these variables.

**Exercise 9-2:**

We have the values of the mortgage interest rate  $X$  (in %) as well as the

seasonally adjusted order inflow in the construction sector (in 1000 EUR) for private construction during a time period of 6 months.

Month i	1	2	3	4	5	6
$x_i$	6	5	7	7	8	9
$y_i$	3000	3200	2500	2300	2000	2000

Determine:

1. the correlation coefficients
2. the linear regression function
3. the coefficient of determination
4. the predicted values for a mortgage interest rate of 4% and 7.5%, respectively.

**Exercise 9-3:**

The total disposable income of 8 private households in March 1992 was 30880 EUR. In the same month, consumption expenditures of these households was 26800 EUR. For a one Euro increase in income, these households spend 0,813 EUR for consumption on average.

1. Give the (economically reasonable) linear regression function.
2. Which consumption expenditures are to be expected for a disposable income of 2800 EUR?