



## “Business Statistics” (2016)

Winterterm 2009/2010

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*Please answer all of the following questions. Do not expect all numerical results to be integers. Please explain all your answers briefly, so that calculations and derivations can be fully accounted for. The use of calculators is permitted in accordance with the regulations of the faculty's examination office. Please declare on your solution paper whether you write your answer in English or in German.*

### Task 1

Motorola used the normal distribution to determine the probability of defects and the number of defects expected in a production process (*APICS—The Performance Advantage*, July 1991). Assume a production process produces items with a mean weight of 10 grams. Calculate the probability of a defect and the expected number of defects for a 1000 unit production run in the following situations.

- The process standard deviation is 0.15, and the process control is set at plus or minus one standard deviation. Thus, units with weights less than 9.85 or greater than 10.15 grams will be classified as defects.
- Through process design improvements, the process standard deviation can be reduced to 0.05. Assume the process control remains the same, with weights less than 9.85 or greater than 10.15 grams being classified as defects.

### Task 2

A simple random sample of the asking prices (in thousands of euros) of four houses currently for sale in each of three residential areas resulted in the following data.

Area 1	Area 2	Area 3
92	90	81
89	102	86
98	96	75
105	88	90

Use the ANOVA procedure to test whether the mean asking price is the same for all three areas. Use  $\alpha = 0.05$ .

Bitte wenden!



### Task 3

M&M/MARS, makers of M&M® sweets, conducted a national poll in which more than 10 million people indicated their preference for a new colour. The tally of this poll resulted in the replacement of tan coloured M&Ms with a new blue colour. In a brochure produced by M&M/MARS Consumer Affairs, the distribution of colours for the sweets is as follows:

Brown	Yellow	Red	Orange	Green	Blue
30%	20%	20%	10%	10%	10%

In a study reported in *Chance* (no. 4, 1996), samples of bags were used to determine whether the reported percentages were indeed valid. The following results were obtained for one sample of 506 sweets.

Brown	Yellow	Red	Orange	Green	Blue
177	135	79	41	36	38

Use  $\alpha = 0.05$  to determine whether these data support the percentages reported by the company using a nonparametrical test.

### Task 4

Ten test-market cities were selected as part of a market research study designed to evaluate the effectiveness of a particular advertising campaign. The sales amounts for each city were recorded for the week prior to the promotional campaign. Then the campaign was conducted for two weeks and new sales data were collected for the week immediately after the campaign. The two sets of sales data (in thousands of euros) follow.

City	Pre-campaign sales	Post-campaign sales
A	130	160
B	100	105
C	120	140
D	95	90
E	140	130
F	80	82
G	65	55
H	90	105
I	140	152
J	125	140

Use  $\alpha = 0.05$ . What conclusion would you draw about the value of the advertising campaign using a nonparametrical test?