EXAMINATION: MARKETING MODELS & ANALYSIS WS 2007/08
EXAMINER: PROF. DR. B. ERICHSON, NUMBER OF LECTURE: 2683

You are allowed to use a non-programmable pocket calculator without communication functions.
The answers to all questions should be made in one language, please use English or German.
All of the 6 exam questions must be answered (the estimated time for each question is given).
This examination has 4 pages.

Attention: Instead of a decimal point "." in numbers we use a comma "," here!

Question 1: Basics (10 Min.)

Imagine to be a product manager who wants to analyze the market response for his product, a probiotic yoghurt drink.

a) There are many factors that influence the demand and could enter a model as independent variables. How can you classify these variables? For decision making it is important to distinguish at least between two types of variables. Give a few examples for each type!

b) A typical dependent variable of a market response function is the sales volume. What other variables could be of importance?

c) Name different purposes of a model!

Question 2: ADBUDG (5 Min.)

As an example for the Decision Calculus Concept John D. Little has presented his ADBUDG - Model:

$$x = b + (a - b) \cdot \frac{w^c}{d + w^c}$$

a) What is the maximal sales volume that can be reached under this model?

b) The model can have a concave or an S-shaped form. Which parameter determines the form? What is the quanitiy of this parameter to have an S-shaped form?

c) A generally acknowledged criterion for the goodness of a scientific method is objectivity. But in his Decision Calculus Concept John D. Little postulates, that the user of a model should have the ability to enter subjective judgments. Discuss this contradiction!

Question 3: Excel (12 Min.)

A friend of you got data on sales and price and wants to estimate a linear PRF by use of Excel Solver. The screen shot below shows his Excel spreadsheet.

a) Which estimation principles do you know and which one is used by your friend?

b) Please specify in the solver window the

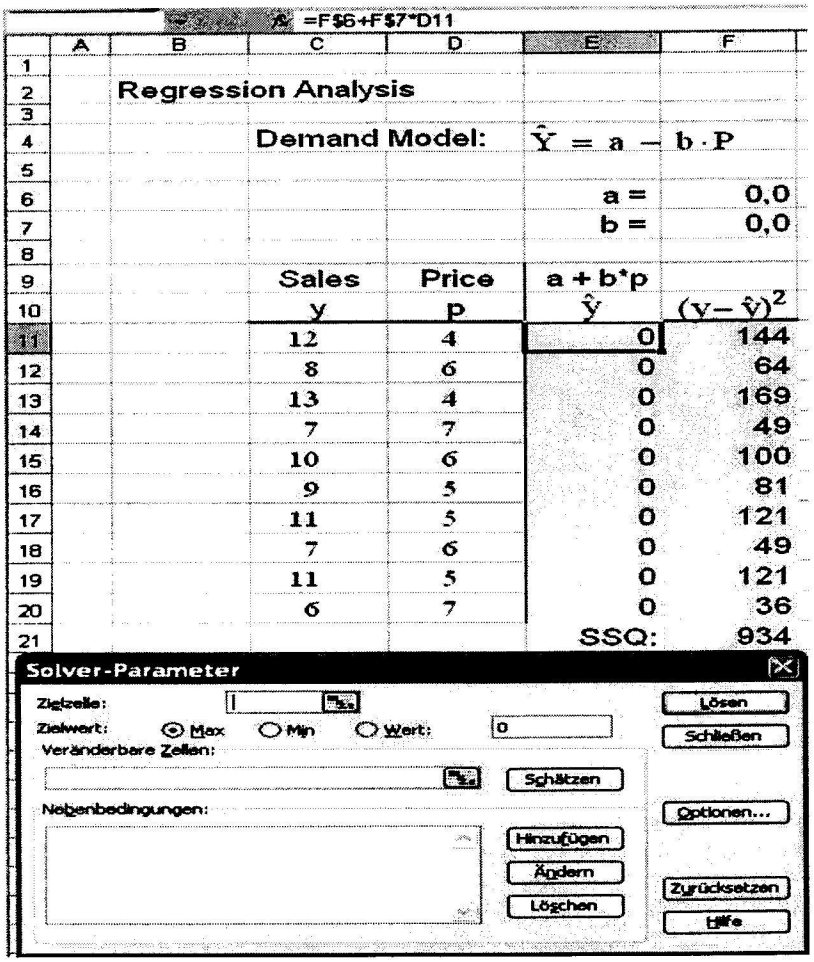
b1) target cell (objective function)

b2) target value (e.g. Min or Max)

b3) changing cells (estimation parameters or decision variables)

c) What advantage does the use of the Excel solver offer compared to a standard program for regression analysis?

d) Alas, sometimes the Solver provides nonsense solutions. How can you cope with this problem?



Question 4: Advertising (10 Min.)

By using regression analysis the following advertising response function was estimated:

$$x_t = 2000 + 500 \cdot \ln(w_t) + 0{,}6 \cdot x_{t-1}$$

with x_t = sales in period t

w_t = advertising spending in period t

a) What is the optimal advertising budget, if you take a short term perspective?

assume:

p = 5 price per unit

k = 3 variable cost per unit

b) Determine the optimal long-term advertising budget!

c) Explain the "flat maximum principle" for advertising decisions! Which conclusions can you draw from it?

Question 5: Growth Models (12 Min.)

The company Clean&Proper has to predict the number of buyers for his new fabric softener "Softy" that will be launched onto the market. They want to use the Geometric Model:

Cumulated buyers: $y_t = M \cdot \left[1-(1-c)^t\right]$ $(0<c<1)$ (1)

Buyers per period: $s_t = y_t - y_{t-1} = (M - y_{t-1}) \cdot c = M \cdot (1-c)^{t-1} \cdot c$

Based on Test-Market Simulation they got the estimates:

$M = 40$ Mio., $c = 0{,}1$ per month

a) Explain the meaning of M and c!

b) Make predictions for the first three months after launch! Use the following table:

t	$M - y_{t-1}$	s_t	y_t
1	40		
2			
3			

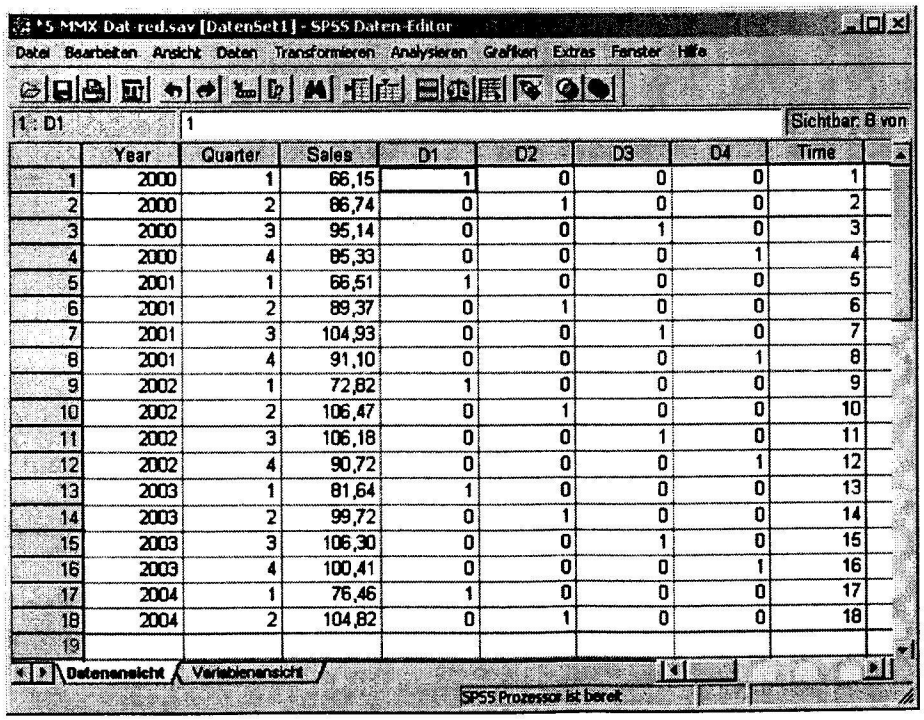
c) An extended Geometric Model 2 has the form

$$y_t = M - b \cdot (1-c)^t \qquad (0<c<1) \qquad (2)$$

Explain the difference between the models (1) and (2)!

Question 6: Prediction (11 Min.)

For the following data set a linear trend analysis with seasonal effects was performed by using SPSS. The SPSS output is shown below.



	Year	Quarter	Sales	D1	D2	D3	D4	Time
1	2000	1	66,15	1	0	0	0	1
2	2000	2	86,74	0	1	0	0	2
3	2000	3	95,14	0	0	1	0	3
4	2000	4	85,33	0	0	0	1	4
5	2001	1	66,51	1	0	0	0	5
6	2001	2	89,37	0	1	0	0	6
7	2001	3	104,93	0	0	1	0	7
8	2001	4	91,10	0	0	0	1	8
9	2002	1	72,82	1	0	0	0	9
10	2002	2	106,47	0	1	0	0	10
11	2002	3	106,18	0	0	1	0	11
12	2002	4	90,72	0	0	0	1	12
13	2003	1	81,64	1	0	0	0	13
14	2003	2	99,72	0	1	0	0	14
15	2003	3	106,30	0	0	1	0	15
16	2003	4	100,41	0	0	0	1	16
17	2004	1	76,46	1	0	0	0	17
18	2004	2	104,82	0	1	0	0	18
19								

ANOVA(b)

Modell		Quadratsumme	df	Mittel der Quadrate	F	Signifikanz
1	Regression	2964,015	4	741,004	47,319	,000(a)
	Residuen	203,578	13	15,660		
	Gesamt	3167,593	17			

a Einflußvariablen : (Konstante), Time, D4, D3, D2
b Abhängige Variable: Sales

Koeffizienten(a)

Modell		Nicht standardisierte Koeffizienten		Standardisierte Koeffizienten	T	Signifikanz
		B	Standardfehler	Beta	B	Standardfehler
1	(Konstante)	63,562	2,403		26,451	,000
	D2	23,691	2,509	,800	9,441	,000
	D3	30,422	2,655	,953	11,460	,000
	D4	18,157	2,661	,569	6,824	,000
	Time	1,017	,181	,398	5,631	,000

a Abhängige Variable: Sales

a) Write down the estimated function and judge the global goodness of fit of this function by computing R^2!

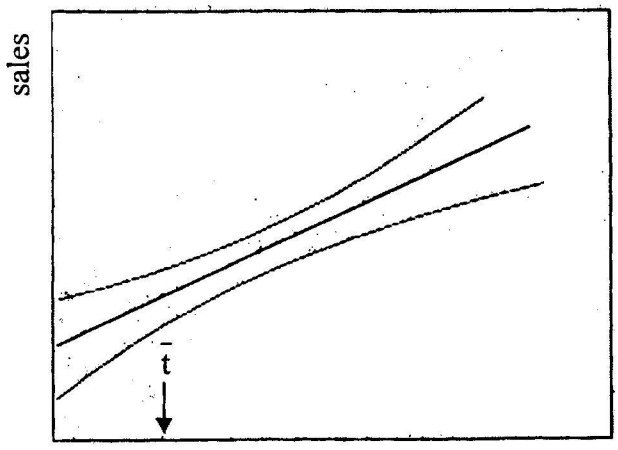
b) Make predictions for periods 20 and 21!

c) The prediction error could be calculated by

$$s_p = s \cdot \sqrt{1 + \frac{1}{T} + \frac{(t_s - \bar{t})^2}{\sum_t (t - \bar{t})^2}}$$

How does the prediction error change with the number of observations?

d) The graph below shows how the prediction error changes with t. Alas, a small mistake occurred in the graph. What is wrong?



Good Luck!