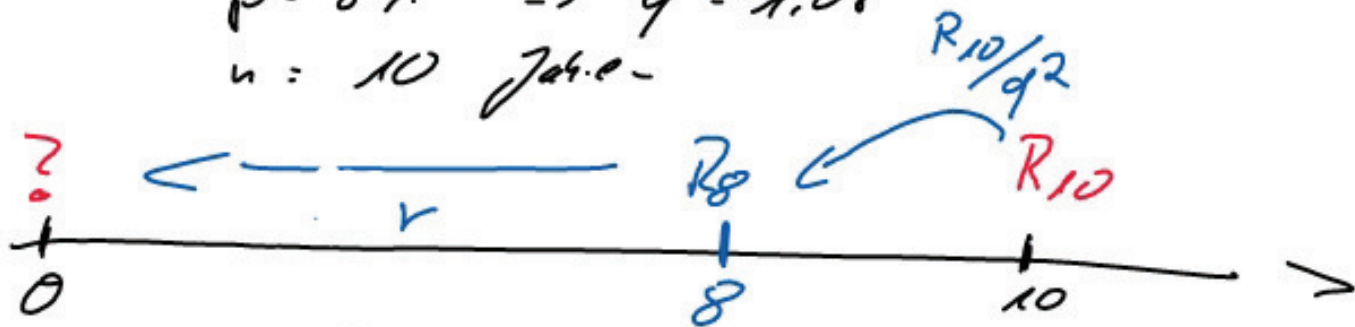


	120000			
1	109000	11000	9,17%	9,17%
2	98000	11000	10,09%	9,17%
3	87000	11000	11,22%	9,17%
4	76000	11000	12,64%	9,17%
5	65000	11000	14,47%	9,17%
6	54000	11000	16,92%	9,17%
		11000		

	120000			
1	93600	26400	22%	22,00%
2	73008	20592	22%	17,16%
3	56946	16062	22%	13,38%
4	44418	12528	22%	10,44%
5	34646	9772	22%	8,14%
6	27024	7622	22%	6,35%
	27023,9521			

	200000,00			
1	165000,00	35000,00	17,50%	17,50%
2	136125,00	28875,00	17,50%	14,44%
3	112303,13	23821,88	17,50%	11,91%
4	92650,08	19653,05	17,50%	9,83%
5	76436,31	16213,76	17,50%	8,11%
6	63059,96	13376,36	17,50%	6,69%
7	52024,47	11035,49	17,50%	5,52%
8	42920,18	9104,28	17,50%	4,55%
9	35409,15	7511,03	17,50%	3,76%
10	29212,55	6196,60	17,50%	3,10%
11	24100,35	5112,20	17,50%	2,56%
12	19882,79	4217,56	17,50%	2,11%
13	16403,30	3479,49	17,50%	1,74%
14	13532,73	2870,58	17,50%	1,44%
15	11164,50	2368,23	17,50%	1,18%
16	9210,71	1953,79	17,50%	0,98%
17	7598,84	1611,87	17,50%	0,81%
18	6269,04	1329,80	17,50%	0,66%
19	5171,96	1097,08	17,50%	0,55%
20	4266,87	905,09	17,50%	0,45%

1)  $gof : v = 12.500$  (wachstumsfähig)  
 $p = 8\% \Rightarrow q = 1.08$   
 $n = 10$  Jahre



$$R_n = v \cdot \frac{q^n - 1}{q - 1} \Rightarrow R_{10} = 181.082$$

$$K_0 ? \quad K_n = R_n = K_0 \cdot q^n$$

$$K_0 = \frac{R_n}{q^n} = 83.876$$

## Lösungen:

$$\text{zu 1)} \quad R_{10} = 12.500 \cdot \frac{1,08^{10} - 1}{1,08 - 1} = 181.083,03$$

$$R_0 = \frac{181.083,03}{1,08^{10}} = 83.876,48$$

$$\text{zu 2)} \quad R_0 = r \cdot \frac{q^n - 1}{q^{n+1} - q^n}$$

$$r = R_0 \cdot \frac{q^{n+1} - q^n}{q^n - 1} = 10.380 \cdot \frac{1,05^{16} - 1,05^{15}}{1,05^{15} - 1} \approx 1.000$$

$$\text{zu 3)} \quad R_n = r \cdot \frac{q^n - 1}{q - 1}$$

$$n = \frac{\log\left[\frac{R_n}{r} \cdot (q - 1) + 1\right]}{\log(q)} = \frac{\log\left[\frac{29.792,82}{2.500} \cdot 0,05 + 1\right]}{\log(1,05)} = 12 \text{ Jahre}$$

$$\begin{aligned} 1) \text{ gef: } K_n &= 100.000 \\ p &= 6\% \Rightarrow q = 1,06 \\ r &= 1.000 \Rightarrow r^* = 1.000 \cdot 1,06 = 1.060 \end{aligned}$$

$$K_n = r \cdot \frac{q^n - 1}{q - 1}$$

$$100.000 = 1060 \cdot \frac{1,06^n - 1}{0,06}$$

$$\left( \frac{100.000}{1060} \cdot 0,06 \right) + 1 = 1,06^n \quad | \text{ log}$$

$$\text{log} \left[ \left( \frac{100.000}{1060} \cdot 0,06 \right) + 1 \right] = n \cdot \text{log} 1,06$$

## Lösungen:

$$\text{zu 1) } R_n = r \cdot q \cdot \frac{q^n - 1}{q - 1} = r \cdot \frac{q^{n+1} - q}{q - 1}$$

$$q^n = \frac{R_n}{r \cdot q} \cdot (q - 1) + 1$$

$$n = \frac{\log \left[ \frac{R_n}{r \cdot q} \cdot (q - 1) + 1 \right]}{\log(q)}$$

$$n \geq \frac{\log \left[ \frac{100.000}{1.000 \cdot 1,06} \cdot (1,06 - 1) + 1 \right]}{\log(1,06)} = 32,54 \approx 33 \text{ Jahre}$$

$$\text{zu 2) } R_{2016} = r \cdot \frac{q^{n+1} - q}{q - 1} = 5.000 \cdot \frac{1,05^5 - 1,05}{1,05 - 1} = 22.628,16$$

$$K_{2009} = R_{2016} \cdot q^{-n} = \frac{22.628,16}{1,05^3} = 19.547,05$$

## Lösung:

*Einzahlung:*

$$r_e = r \cdot \left[ m + \frac{i \cdot (m-1)}{2} \right] = 1.000 \cdot \left[ 4 + \frac{0,05 \cdot 3}{2} \right] = 4.075$$

$$R_{20} = r_e \cdot \frac{q^n - 1}{q - 1} = 4.075 \cdot \frac{1,05^{20} - 1}{1,05 - 1} = 134.743,76$$

*Auszahlung:*

$$r_e^* = r \cdot \left[ m + \frac{i \cdot (m + 1)}{2} \right] = 1.000 \cdot \left[ 12 + \frac{0,05 \cdot 13}{2} \right] = 12.325$$

$$n = \frac{\log \left[ \frac{R_n}{r_e^*} \cdot (q - 1) + q \right]}{\log(q)} - 1$$

$$n = \frac{\log \left[ \frac{134.743,76}{12.325} \cdot (0,05) + 1,05 \right]}{\log(1,05)} - 1 \approx 8,5 \text{ Jahre}$$

## Lösung:

zu 1) Nachschüssig:  $r = R_0 \cdot i = 200.000 \cdot 0,07 = 14.000$

Vorschüssig:  $r = R_0 \cdot \frac{i}{q} = 200.000 \cdot \frac{0,07}{1,07} = 13.084,11$

zu 2a) Sparbuchmethode:  $K_{x,t_0} = K_0 \cdot \left(1 + i \cdot \frac{t_1}{360}\right) \cdot (1 + i)^n$

$$K_{31.12} = 80.000 \cdot \left(1 + 0,05 \cdot \frac{1}{2}\right) \cdot (1,05)^5 = 104.655,09$$

zu 2b)  $i = \frac{r}{R_0} = \frac{2.500}{104.655,09} = 0,02388 \approx 2,4\%$

zu 2c)  $r_e = r \cdot \left[m + \frac{i \cdot (m-1)}{2}\right] = r \cdot \left[2 + \frac{0,075 \cdot 1}{2}\right] = r \cdot 2,0375$

$$r \cdot 2,0375 = R_0 \cdot i = 104.655,09 \cdot 0,075 = 7.849,13$$

$$r = \frac{7.849,13}{2,0375} = 3.852,33$$