

①  $C = 8\% \rightarrow 4\% \text{ p.s.}$   
 $FV = 1000$   
 $n = 34 \rightarrow 6$   
 $um = 10\% \rightarrow 5\% \text{ p.s.}$

A)  
 MOD. DURATION = 2

$$\text{DURATION} = \frac{1 \cdot \frac{40}{1+0,05} + 2 \cdot \frac{40}{(1+0,05)^2} + 3 \cdot \frac{40}{(1+0,05)^3} + \dots + 6 \cdot \frac{40+1000}{(1+0,05)^6}}{\sum_{i=1}^6 \frac{40}{(1+0,05)^i} + \frac{1000}{(1+0,05)^6}} = P_0$$

$$\text{DURATION} = \frac{5.191,039812}{949,2430} = 5,4348 \text{ SEMI ANNUALS PERIODS}$$

$$\text{MOD. DURATION} = \frac{2,7174}{1+0,05} = 2,588\% \rightarrow 2,7174 \text{ YEARS}$$

3)  $um = 10\% \rightarrow ym = 9,5\% \Rightarrow -0,5\%$

$$\% \Delta P = -2,588 \cdot (-0,5) = +1,294\%$$

$$P(ym = 9,5\%) = 949,2430 \cdot (1+0,01294) = 961,5262$$

$$n = 124 \rightarrow 24$$

$$c = 10\% \rightarrow 5\%$$

$$r = 9,5\% \rightarrow 4,75\%$$

$$\text{DURATION} = 4,3294$$

$$\text{MOD. DURATION} = \frac{4,3294}{1+0,0475} = \underline{6,9970\%}$$

$$P_0 = \sum_{i=1}^{24} \frac{50}{(1+0,0475)^i} + \frac{1000}{(1+0,0475)^{24}} = \underline{1.035,351344}$$

$$a) \Delta 4m = +150 \text{ bp} = 1,5\%$$

$$\% P_{\Delta} = -6,9970 \cdot (1,5) = \underline{-10,4955\%}$$

$$P(4m = 11\%) = 1.035,351344 \cdot (1 - 0,104955) = \underline{926,6860}$$

$$b) \Delta 4m = -300 \text{ bp} = -3\%$$

$$\% P_{\Delta} = -6,9970 \cdot (-3) = \underline{+20,991}$$

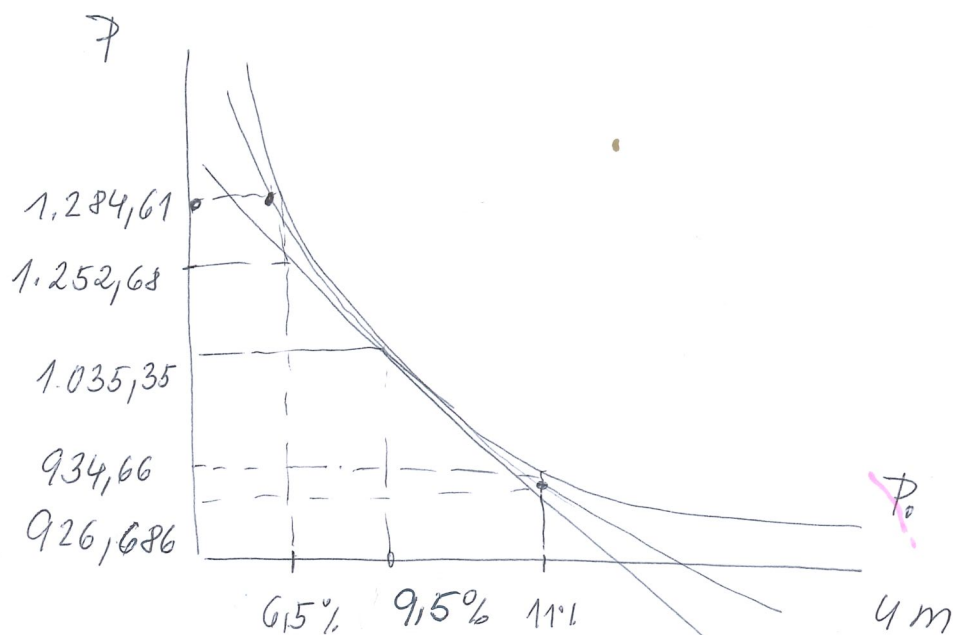
$$P(4m = 6,5\%) = 1.035,351344 \cdot (1 + 0,20991) = \underline{1.252,6819}$$

$$c) \bullet \% P_{\Delta} = -6,9970 \cdot (0,015) + 0,5 \cdot 68,54 \cdot 0,015^2 = \underline{-0,09424}$$

$$P(4m = 11\%) = 1.035,351344 \cdot (1 - 0,09424) = \underline{934,6694}$$

$$\bullet \% P_{\Delta} = -6,9970 \cdot (-0,03) + 0,5 \cdot 68,54 \cdot (-0,03)^2 = \underline{0,240453}$$

$$P(4m = 6,5\%) = 1.035,351344 \cdot (1 + 0,240453) = \underline{1.284,6153}$$



3 a) MODIFIED DURATION =  $\frac{9}{1+0,04} = \underline{8,6538\%}$

b)  $\downarrow c \rightarrow \uparrow$  MODIFIED DURATION

$\downarrow$  MATHEMATIK  $\rightarrow \downarrow$  MODIFIED DURATION

4  $P_0 = 100$

MODIFIED DURATION = 6,8%

$\% P_{\Delta}(4m = 6,5\%) = - 6,8 \cdot (-0,45\%) = \underline{5,1\%}$

$P(4m = 6,5\%) = 100 \cdot (1 + 0,051) = \underline{105,1}$

$\% P_{\Delta}(4m = 6,5\%) = - 6,8 \cdot (-0,0045) + 0,5 \cdot 0,6 \cdot (-0,0045)^2$   
 $= 0,05102 \rightarrow \underline{5,102\%}$

$P(4m = 6,5\%) = 100 \cdot (1 + 0,05102) = \underline{105,102}$