

Memo P2

Question 1

a $P_{n+1} = P_n \left(1 + \frac{7,5}{1200}\right) - 8000$

$P_0 = 500\,000$ $n \in \mathbb{N}$

3

b $T_1 = P_1 = R\,495\,125$

$T_2 = P_2 = R\,490\,219,53$

$T_3 = P_3 = R\,485\,283,40$

3

c 45

2

d $\left(1 + \frac{7,5}{1200}\right)^{12} = \left(1 + \frac{i}{100}\right)^1$

$7,76\% = i$

2

Question 2

A: Paid more than needed. OB decreasing faster

B: Just paid enough to cover interest. OB stay same

C: Paid less than monthly payment. OB increased. Could be financial trouble or increase in interest rate.

D: Paid more than needed. Decreasing faster

8

Question 3

$$a. \quad OB_{48} = \frac{250\,000 \left[1 - \left(1 + \frac{9,34}{1200} \right)^{-12} \right]}{\frac{9,34}{1200}} = R\,2\,853\,580,82$$

4

$$b. \quad 250\,000 \left(1 + \frac{9,34}{1200} \right)^{11} + 250\,000 \left(1 + \frac{9,34}{1200} \right)^{10} + 250\,000 \left(1 + \frac{9,34}{1200} \right) = R\,806\,354,14$$

7

$$c. \quad 37\,000\,000 = \frac{630\,000 \left[1 - \left(1 + \frac{9,34}{1200} \right)^{-y} \right]}{\frac{9,34}{1200}} + y \left(1 + \frac{9,34}{1200} \right)^y$$

$$y = R\,22\,037,22$$

6

Question 4

$$a. \quad 160\,000 = \frac{x \left[\left(1 + \frac{24}{1200} \right)^{120} - 1 \right]}{\frac{24}{1200}}$$

4

$$x = R\,327,70$$

$$b. \quad T_{84} = \frac{327,70 \left[\left(1 + \frac{24}{1200} \right)^{84} - 1 \right]}{\frac{24}{1200}} = R\,70\,084,09$$

4

$$c. \quad 70\,084,09 - 10\,000 = 60\,084,09$$

$$160\,000 - 60\,084,09 \left(1 + \frac{11}{1200} \right)^{36} = \frac{x \left[\left(1 + \frac{11}{1200} \right)^{36} - 1 \right]}{\frac{11}{1200}}$$

$$x = R\,1804,45 \therefore \text{Increase } R\,392,29$$

6

Question 5

a $10\,000 = 3000(1+i)^{12}$ 3
 $10,6\% = i$

b $3000 = A(1+i)^4$ 3
 $A = 2049$

c $P_{n+1} = P_n(1+0,1) - 350$ $P_0 = 3000$ 3
21 Months

d Malthusian. No Carrying Capacity. 1

Question 6

a $A = \frac{42,626 - 38,457}{2} = 2,0845$

$B = 1,9135$

$P = \frac{1,4805}{49,753} = 0,0298$ 6

$Q = 0,0229$

b $y = 0,151584 - 0,002465x$ 4
 $61,49... = x$

c 61 Million $(x\text{-int } y=0)$ 2

Question 7

ai $0,05 = \frac{50}{100} \times \frac{2}{18} \times \text{survival} \times 2$ 3
 $45\% = \text{survival rate}$

ii $0,0075 \times 40 \times 10 = 3$ 3

iii $\frac{1}{0,0069} \times 12 = 12,07 \approx 12$ 2

iv $f \cdot 0,0075 \cdot 40 \cdot 10 = \frac{5}{12}$ 3
 $f = 0,139$

v. $B_n = B_n + 0,05 B_n \left(1 - \frac{B_n}{300}\right) - 0,0075 B_n C_n$
 $0,0075 B_n C_n = 0,05 B_n \left(1 - \frac{B_n}{300}\right)$

$$0,0075 C_n = 0,05 \left(1 - \frac{24}{300}\right)$$

$$6,13... = C_n$$

$$6 = C_n$$
 3

bi Flattens out

ii 300

iii ± 100

Question 8

$$K = 25\,000 \checkmark \checkmark$$

$$c = \frac{1}{20} = 0,05 \checkmark \checkmark$$

$$a = 0,5 \times 2 \times 0,6 = 0,6 \checkmark \checkmark$$

$$b. P_0 \cdot S_0 = 4500$$

$$b(6000)(1500) = 4500$$

$$b = 0,0005 \checkmark \checkmark$$

$$f. b. P_0 \cdot S_0 = 100$$

$$f(0,0005)(6000)(1500) = 100$$

$$f = 0,022 \checkmark \checkmark$$

10