Gr 12 AP Choice 2016.

1.1.1. $T_n = a\,T_{n-1} + b\,T_{n-2}$

$T_5 = a\,T_4 + b\,T_3$ $\quad T_4 = a\,T_3 + b\,T_2$

$41846{,}36 = 11847{,}51a + 3337{,}769b$

$11847{,}51 = 3337{,}769a + 997{,}5b.$ (7)

$a = 3{,}245 \quad b = 1{,}019$

1.2. $3337{,}769 = 3{,}245(997{,}5) + 1{,}019(T_1)$

$\therefore T_1 = 99{,}000$ (3)

2.1 $A = 5600\left(1 + \frac{6{,}84\%}{4}\right)^{20}$ $\quad$ Int earned $= A - P$

$= 7860{,}69\ldots$ $\quad = R\ 2260{,}70$ (4)

2.2 $10\,033{,}38 = \frac{x\left((f)^{20} - 1\right)}{(f) - 1}$ $\quad (f) = 1 + \frac{6{,}84\%}{4}$

$x = R\,424{,}999$

$= R\,425{,}00$

2.3 $\left(1 + \frac{6{,}84\%}{12}\right)^{12} = \left(1 + \frac{i^{(4)}}{4}\right)^4$

$(B) = \left(1 + \frac{i^{(4)}}{4}\right) = \left(1 + \frac{6{,}84\%}{12}\right)^3$

quarterly payments $\therefore$ interest needs to be quarterly.

$A = \frac{420\left((B)^{20} - 1\right)}{(B) - 1.}$

$= R\,9924{,}93$

3.1.

2 payments after normal $\quad A = 1 + \frac{21\%}{12}$

$$85000\,A^{n} = \frac{2000\left(A^{n-2} - 1\right)}{A - 1}$$

use calc and $\boxed{\text{SOLVE}}$

$\therefore n = 86{,}7$

$\therefore$ 87 payments.

3.2

$$BO = 85000\,A^{87} - \frac{2000\left(A^{85} - 1\right)}{A - 1}$$

$$= R1411{,}73$$

3.3. a)

$$BO = 85000\,A^{36} - \frac{2000\left(A^{34} - 1\right)}{A - 1} - 60\,000$$

$$= R\;6875{,}39$$

b)

$$6875{,}39\,A^{51} = \frac{x\left(A^{51} - 1\right)}{A - 1}$$

Now # payments + loan length are equal

$\therefore x = R204{,}91.$

4. 2 litters per year of 3 kittens.

Survival rate = 70%

Female population = 55%.

Life expectancy is 7 years.

4.1 birth rate = % female x survival rate x # young

$= 55\% \times 70\% \times 6$

$= 2,31$

Annual growth rate = birth rate $- \frac{1}{\text{life exp}}$

$= 2,31 - 1/7$

$= 2,167$

4.2 $P_{n+1} = P_n (1+r)$

$= P_n (3,17)$

4.3 $P_0 = 15$

$P_1 = 47,55$

$P_2 = 150,73$

$P_3 = 477,8$

$P_4 = 1514,7$

$P_5 = 4801,6$

$P_6 = 15221,1$

$P_7 = 48250,97 = 48251$

5. $y = -0{,}0002x + 0{,}0213$

5.1. a) $y\text{-int} = 0{,}0213$ $\quad r = 0{,}0213$ 1

b) $x\text{-int} = 106{,}5$ $\quad \therefore \quad K = 107$ 2

c) $y = -0{,}0002(32) + 0{,}0213$

$= 0{,}0149.$ 2

d.) $P_{n+1} = P_n + rP_n\left(1 - \frac{P_n}{K}\right)$

$\therefore P_1 = 21{,}35$ $\quad P_0 = 21$

$P_2 = 21{,}72$ $\quad r = 0{,}0213$

$P_3 = 22{,}..$ $\quad K = 107$

$P_4 = 22,$

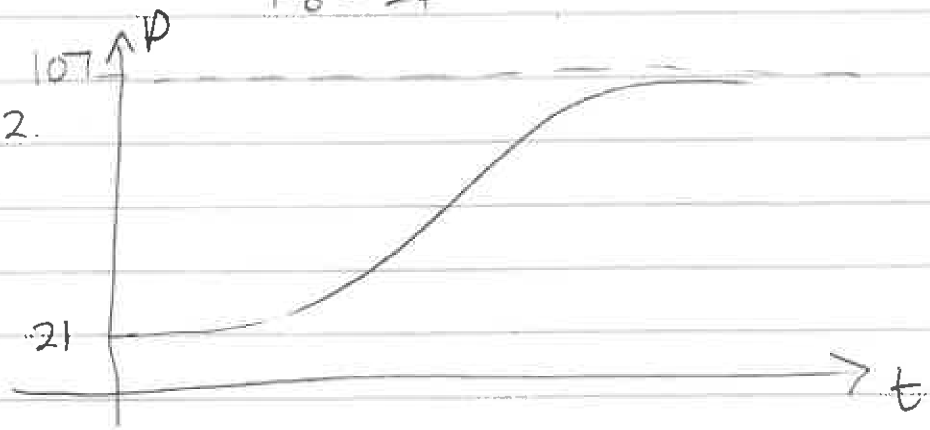
$P_5 = 22$

$P_6 = 23$

$P_7 = 23{,}6$

$P_8 = 24$ 4

5.2.



5

Q 6

6.1 $F_{n+1} = F_n + f \cdot b \cdot R_n F_n - c F_n$

$F_n = F_{n+1}$.

$\therefore F_n = \cancel{F_n} + f \cdot b\, R_n \cancel{F_n} - c \cancel{F_n}$

$\therefore fb\, R_n = c$

$\therefore R_n = \dfrac{c}{fb}$.

6.2 $R_{n+1} = R_n + a R_n \left(1 - \dfrac{R_n}{k}\right) - b \cdot R_n F_n$ $\quad R_{n+1} = R_n$

$\therefore \cancel{R_n} = \cancel{R_n} + a \cancel{R_n}\left(1 - \dfrac{R_n}{k}\right) - b\, F_n$

$a\left(1 - \dfrac{R_n}{k}\right) = b F_n$ $\quad$ but $R_n = \dfrac{c}{fb}$

$\therefore F_n = \dfrac{a}{b}\left(1 - \dfrac{c}{fbK}\right)$

Q7.

7.1 Predator : 30 Prey : 70 (2)

7.2 a. max prey 500

min prey 50 (4)

b. max predator 50

min predator 20

7.3 Low number of predators ∴ increase growth rate

Introduction of more prey. (2)