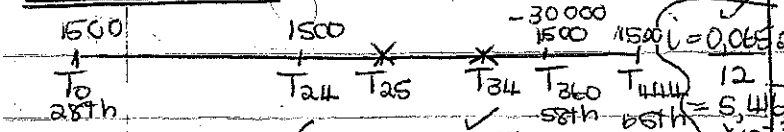
GR 12 AP SEP 2019 P2 MEMO

$P_V(1+A)^{60} = 10\,286{,}05\left[\frac{(1+A)^{57}-1}{A}\right]$

$P_V = R369\,983{,}67$

QUESTION 1



1.1. $FV = \frac{1500\left[(1+A)^{445}-1\right]}{A}$

$- \frac{1500\left[(1+A)^{10}-1\right]}{A}.(1+A)^{410}$

$- 30\,000(1+A)^{84}$

(11) $= R2.599\,589{,}39$

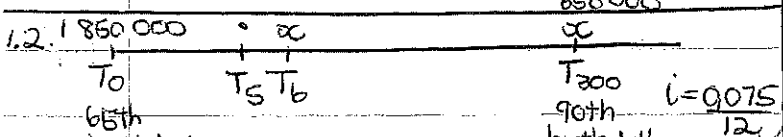
OR

$Fv = \frac{1500\left[(1+A)^{25}-1\right]}{A}(1+A)^{420}$

$+ \frac{1500\left[(1+A)^{410}-1\right]}{A}$

must be CI $- 30\,000(1+A)^{84}$

$= R2\,599\,689{,}39$



1.2. ✓ If use A

$1\,850\,000(1+B)^{5} = \alpha\left[\frac{1-(1+B)^{295}}{B}\right]$

$+ 650\,000(1+B)^{-295}$

$R13\,416{,}98 = \alpha$

OR

$1\,850\,000(1+B)^{300} = \alpha\left[\frac{(1+B)^{295}-1}{B}\right]$

(7) $+ 650\,000$

$R13\,416{,}98 = \alpha$

$Fv = \frac{1500\left[(1+A)^{36}-1\right]}{A}.(1+A)^{410} - \frac{1500\left[(1+A)^{10}-1\right]}{A}$

$+ \frac{1500\left[(1+A)^{410}-1\right]}{A} - 30\,000(1+A)^{84}$

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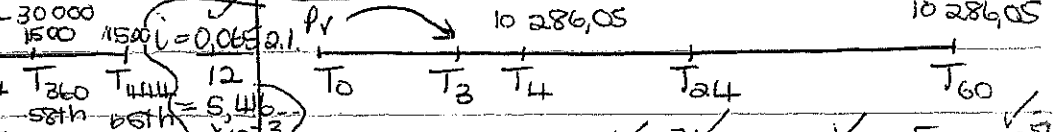
QUESTION 2



$i = \frac{0{,}186}{12} = 0{,}0155$ (A)

$P_V(1+A)^{3} = \frac{10286{,}05\left[1-(1+A)^{-57}\right]}{A}$

(6) $P_V = R369\,983{,}67$

2.2.

$B\,Out(T_{24}) = 369\,983{,}67(1+A)^{24} - \frac{10\,286{,}05\left[(1+A)^{21}-1\right]}{A}$

$U_n = (1+A)U_{n-1} - 10286{,}05$

$U_0 = 369\,983{,}67$

$= R282\,164{,}45$

$U_1 = 383\,176{,}45$

$U_{24} = 282\,164{,}45$ Rounded R282 164

or $B\,Out(T_{24}) = \frac{10\,286{,}05\left[1-(1+A)^{-36}\right]}{A}$

(4) $= R282\,164{,}45$

Rounded R282 164

✓ If don't show equal values

2.3.1.

$U_n = (1+B)U_{n-1} - 30\,000$

$U_0 = 282\,164$

$\left(1+\frac{0{,}186}{12}\right)^{12} = \left(1+\frac{i^*}{4}\right)^{4}$

$0{,}0472\ldots = \frac{i^*}{4}$ (B)

(6)

2.3.2. $U_1 = 265\,489{,}05$

$U_7 = R147\,537{,}74$

principal $= R134\,626{,}26$

interest $= (7 \times 30\,000) - 134\,626{,}26$

(5) $= R75\,373{,}74$

2.3.3 $U_{12} = 20\,971{,}76$ } 12 payments of

$U_{13} = -8037{,}85$ }

(5) Final payment $= 20\,971{,}76(1+B)$ R30 000

$= R21\,962{,}14$

(5) ✓ If don't use recursive formula

26

$(1+A)^{410}$

If $\frac{1}{2}$ instead of 2 ×
$r = 0{,}875$
$P_1 = 26$
$P_4 = 173$ ($\frac{6}{8}$)

if round off here $r = 3{,}88$
$P_4 = 7310$ ($\frac{7}{8}$)

QUESTION 4

4.1 $r = 0{,}4 \times 0{,}25 \times 20 \times 2 - \frac{1}{8}$ ✓✓✓
$= 3{,}875$ ✓ ← if mistake

$P_{n+1} = 4{,}875 P_n \quad P_0 = 14$ ✓ ($\frac{2}{4}$)

$P_1 = 68$ ✓

$P_4 = 7907$ ✓ (8)

4.2 $P_{n+1} = 4{,}875 P_n - 50 \quad P_0 = 14$ ✓✓

$P_1 = 18$ ✓

$P_4 = 632$ ✓ (4) ← if $0{,}5P_n$ ($\frac{1}{4}$ for P_0) [12]

if 4,58, $P_4 = 6411$ ($\frac{3}{4}$)

QUESTION 5

5.1 $a = \frac{64-52}{2} = 6$ ✓ — if 6,0021 × ← even 2 dec pl. b

$\frac{b-57}{2} = 7$

$b = 71$ ✓

$c = \frac{7}{71}$

$= 0{,}0986$ ✓

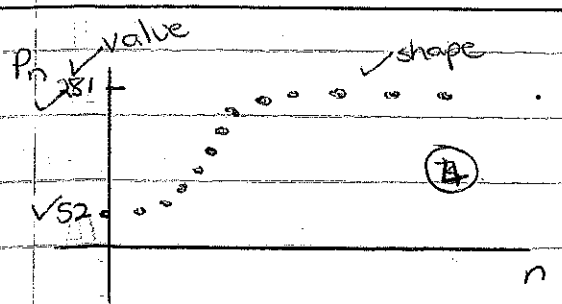
$d = \frac{7}{64}$

$= 0{,}1094$ ✓ (4)

5.2 $\frac{\Delta P}{P} = -0{,}00048P + 0{,}135$ ✓✓✓ (3)

5.3 $r = 0{,}135$ ✓ (1)

5.4



(4)

5.5 $P_{n+1} = P_n + 0{,}135P_n\left(1 - \frac{P_n}{281}\right)$ ✓✓

$P_0 = 52$

$P_1 = 58$ ✓

$P_{10} = 129$ ✓ (4)

5.6 $P_{n+1} = P_n$

$176 = 176 + 0{,}135(176)\left(1 - \frac{176}{281}\right) - x$ ✓

$x = 9$ ✓ (3) [19]

QUESTION 6

6.1 670 zebra ✓ (1)

6.2 lifespan $= \frac{1}{0{,}125} = 8$ yrs ✓✓ (2)

6.3 $f b Z_n L_n$ = no babies

$(0{,}022) b (324)(21) = 4 \times 0{,}75 \times 3 \times \frac{1}{2}$ ✓✓ 4,5 ✓ ← mistake

$b = 0{,}03$ ✓ ($\frac{2}{4}$)

$b Z_n L_n$ = no killed ✓ carry down

$(0{,}03)(324)(21) =$ (6)

accept 205 — 204 ✓ = no killed

6.4 $L_n = \frac{0{,}75}{0{,}03}\left(1 - \frac{0{,}125}{(0{,}022)(0{,}03)(670)}\right)$ ✓✓

$L_n = 18$ ✓ (3)

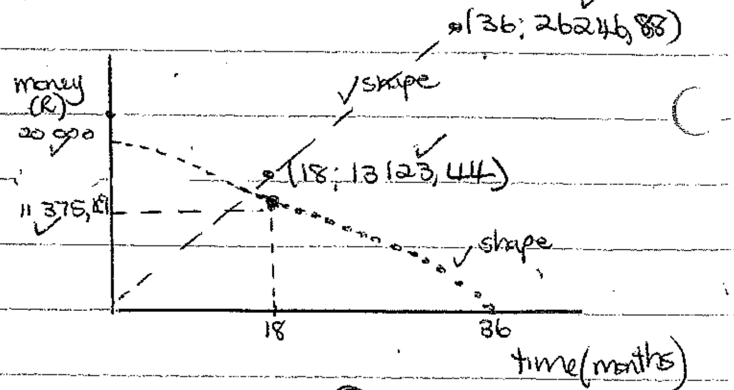
6.5 8th cycle ✓ (A on graph) (2)

6.6 B ✓ and C ✓ on graph (2)

6.7 Numbers of predators are high ✓ (almost at a maximum) (1)

6.8 D ✓ and E ✓ (2) [19]

QUESTION 3

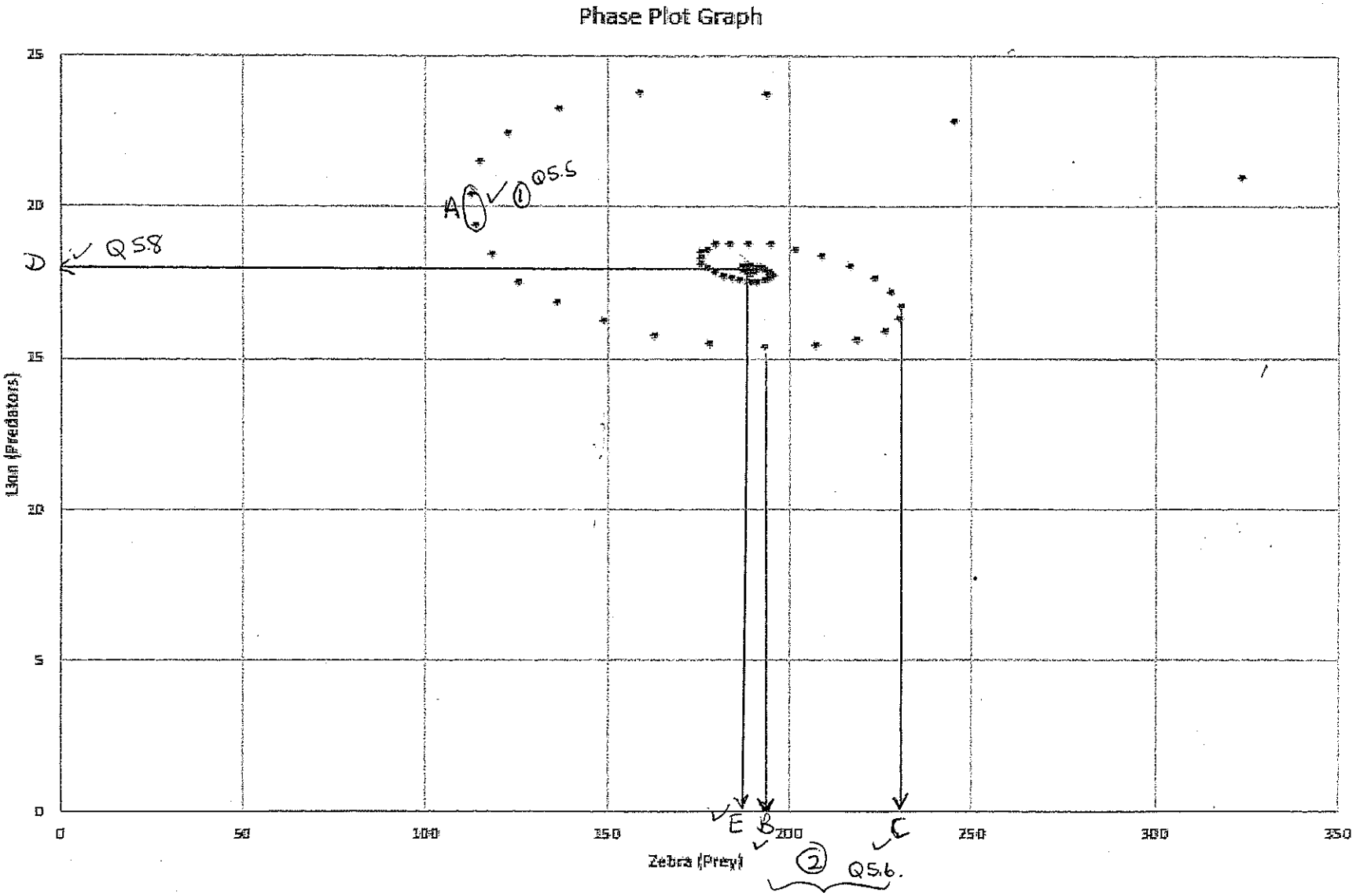


(6)

BOut $(T_{18}) = 729{,}08\left[1 - (1+A)^{-18}\right]$

$= R11\ 375{,}49$
(R11 375,56)

$i = \frac{0{,}186}{12}$
$= 0{,}0155$ (A)


Phase Plot Graph
Lion (Predators)
Zebra (Prey)
0
5
10
15
20
25
0
50
100
150
200
250
300
350
A
D
E
B
C
Q5.8
Q5.5
Q5.6.
1
2