Start here for
Question Number: **9**

a)   (i) $A = 500$ $r = 0.5\%$ per month
$n = 240$.

$$A_1 = 500\left(1 + \frac{r}{100}\right)^n$$
$$= 500\left(1 + \frac{0.5}{100}\right)^{240}$$
$$A_1 = 500(1.005)^{240}$$
$$A_2 = 500(1.005)^{239}$$
$$A_3 = 500(1.005)^{238}$$

the rest follow the same pattern

$$A_{240} = 500(1.005)^1$$

$$\therefore 500(1.005)^1, 500(1.005)^2, \dots 500(1.005)^{240}$$

$$a = 500(1.005) \quad n = 240 \quad r = 1.005$$

$$S_n = \frac{a(r^n - 1)}{r - 1} = \frac{500(1.005)(1.005^{240} - 1)}{1.005 - 1}$$

$$\doteqdot \frac{502.5(1.005^{240} - 1)}{0.005}$$

$$= 232175.5498 \text{ (calc)}$$
$$= 232175.55 \text{ (2d.p)}.$$

(ii)

(1) $A_0 = 232175.55 \times 1.005^n - m$
$A_2 = A_1 \times 1.005 - m$
$= 232175.55 \times 1.005 - m \times 1.005 - m$
$= 232175.55 \times 1.005^2 - 1.005m - m$
$= 232175.55 \times 1.005^2 - m(1 + 1.005)$.

$A_3 = A_2 \times 1.005 - m$

$= 232\,175.55 \times 1.005^2 - m(1+1.005) \times 1.005 - m$

$= 232\,175.55 \times 1.005^3 - m(1+1.005+1.005^2)$

the rest follow the same pattern.

$= 232\,175.55 \times 1.005^n - m(1+1.005+1.005^{n-1})$

$= 232\,175.55 \times 1.005^n - 2000(1+1.005+1.005^{n-1})$

$\cancel{2000+2010} +$

(2) $\quad 0 = 232\,175.55 \times 1.005^n - 200(1+1.005+1.005^{n-1})$

$a=1 \quad r=0.005 \quad n=n-1$

$\dfrac{a(r^n - 1)}{r - 1}$

$232\,175.55 \times 1.005^n = 2\log\left[\dfrac{\left(1.005^{n(n-1)} -1\right)}{1-1.005}\right]$

$\dfrac{232175.55 \times 1.005^n}{200} = \dfrac{(1.005^{n(n-1)} -1)}{0.005}$

$\dfrac{232175.55 \times 1.005^n \times 0.005}{200} = (1.005^{n(n-1)} - 1)$

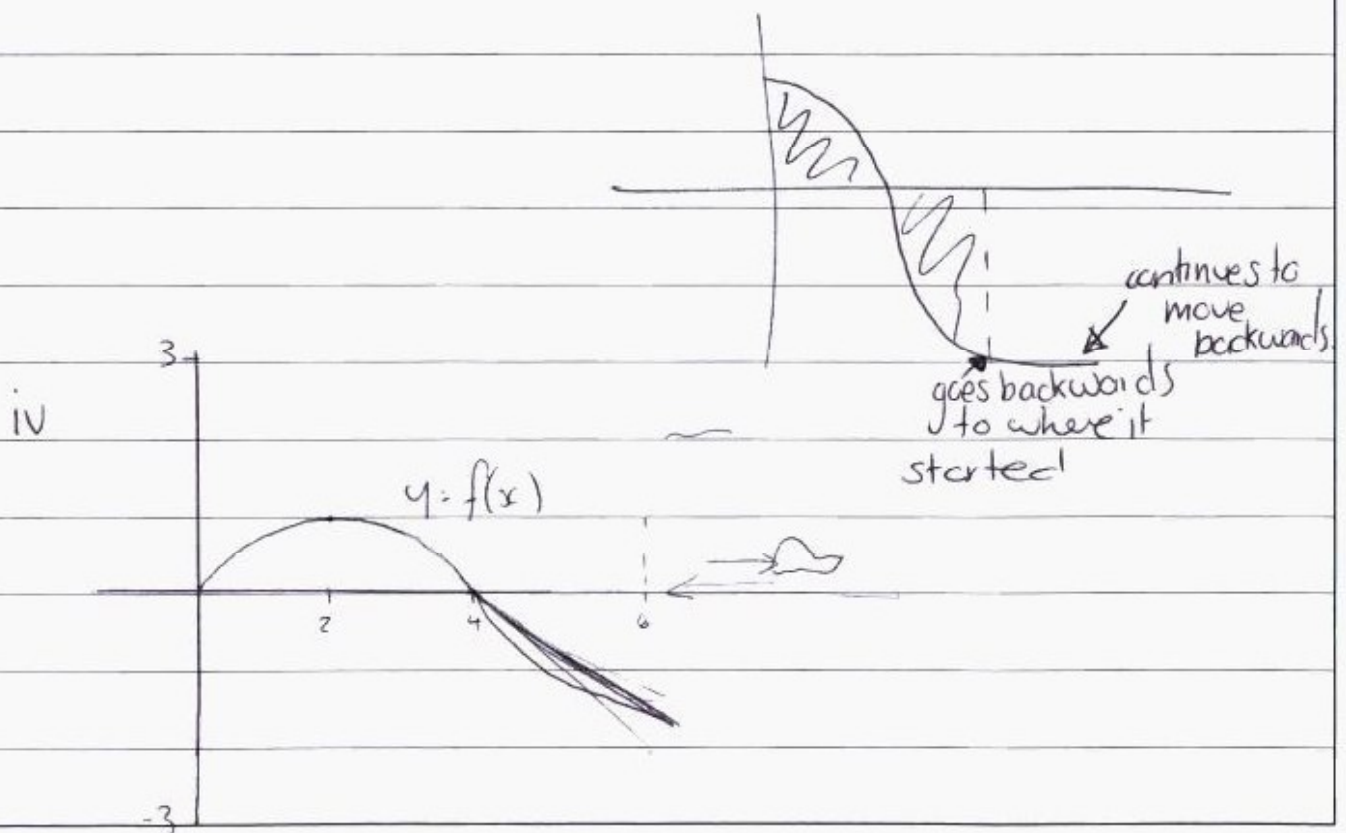$= \dfrac{1160.87775 \times 1.005^n}{200} \qquad = 1.005^{n(n-1)} - 1$

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b) ⅰ). between 0 & 3

$0 \leq x \leq 2$

(ii) max when $x = 3$.

(iii) when $x = 6$, $y = -3$

continues to
move
backwards.

goes backwards
to where it
started

iv

$y = f(x)$

3

-3