Question 6

(a) $-1, +4, +9, +$

$a = -1$ (i) $T_{60} = a + (n-1)d$

$d = 5$

$= -1 + (59 \times 5)$

$\therefore T_{60} = 294$

(ii) $S_n = \frac{n}{2}(a + l)$

$S_{60} = \frac{60}{2}(-1 + 294)$

$\cancel{\therefore S_{60} = 8790}$ $\therefore S_{60} = 8790$

(b) $P = 100(1.23)^t$

$P = 100e^{at}$

$P = 100e^{(1.23)t}$

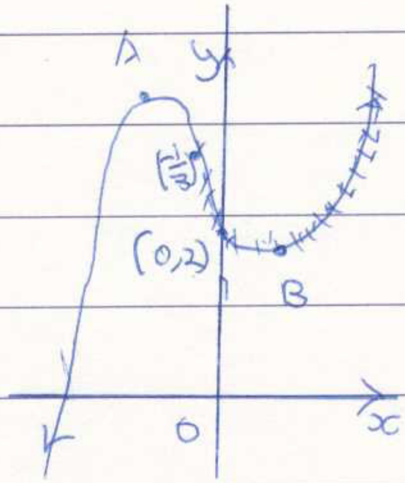
$= 1.23 . 100e(1.23)t$

$= 100 . 1.23)^t$

$\therefore a = 1.23$

P.T.O

(c) $y = x^3 + x^2 - x + 2$



(i)

Stat points, when $\frac{dy}{dx} = 0$

$\frac{dy}{dx} = 3x^2 + 2x - 1$

$3x^2 + 2x - 1 = 0$

$(3x \quad -1)$

$(x \quad 1)$ $\qquad \frac{d^2y}{dx} = 6x + 2$

$\therefore x = \frac{1}{3}$ & -1 $\qquad$ (each determined from longer at graph) once numbers obtained)

$\left(\frac{1}{3}, 1\frac{22}{27}\right)$ $\quad (-1, 3)$

$\frac{d^2y}{dx^2} = \cancel{x} > 0 \therefore$ min $\qquad \frac{d^2y}{dx^2} < \therefore$ max

$\frac{1}{27} + \frac{1}{9} - \frac{1}{3} + 2$ $\qquad \therefore A = (-1, 3)$, & $B = \left(\frac{1}{3}, 1\frac{22}{27}\right)$

(ii) curve concave up from point of inflection till next turning point

point of inflection $= 6x + 2 = 0$

$6x = -2$

$\therefore x = -\frac{1}{3}$ $\quad \therefore y = 2\frac{11}{27}$

$\therefore$ concavity changes at $x = -\frac{1}{3}$, & becomes concave up. Therefore the curve is concave up for values $\geq -\frac{1}{3}$.

(iii) $x^3 + x^2 - x + 2 = k$

$\therefore k$ has real solution when $k = \left(2\frac{11}{27}, 1\frac{22}{27}, 3\right)$ stat points & points of inflection.

P.T.O