Question 6

a) $-1 + 4 + 9 + \ldots$

i. $T_n = a + (n-1)d$

$a = -1 \quad n = 60 \quad d = 5$

$\therefore T_{60} = -1 + (60-1)5$

$= -1 + 295$

$= 294$

$\therefore$ the 60th term $= 294$.

ii. $S_n = \frac{n}{2}[2a + (n-1)d]$

$n = 60 \quad a = -1 \quad d = 5$

$\therefore S_{60} = \frac{60}{2}[2(-1) + (60-1)5]$

$= 30[-2 + 295]$

$= 30(293)$

$= 8790$

b) $1.23 \div e^1$ $\qquad 1.23^t = e^d$

$= 0.452491712$

d) i. $y = x^3 + x^2 - x + 2$

$y' = 3x^2 + 2x - 1$

$\frac{(3x-1)(3x+3)}{3} = 0 \quad \begin{matrix} x-3 \\ +2 \end{matrix}$

$\frac{(3x-1)\cancel{3}(x+1)}{\cancel{3}} = 0$

$\therefore x = 1/3$ and -1

$y = (1/3)^3 + (1/3)^2 - (1/3) + 2$
$= 1/3 + 1/3 - 1/2 + 2$
$= 2 1/6$

$\therefore$ Point $(1/3, 2 1/6) = B$.

for $x = -1$

$y = (-1)^3 + (-1)^2 - (-1) + 2$
$= -1 + 1 + 1 + 2$
$= 3$

$\therefore$ Point $(-1, 3) = A$.

ii. $y' = 3x^2 + 2x - 1$

$y'' = 6x + 2$

for point $(1/3, 2 1/6)$, $y'' = 6(1/3) + 2 = 4 \rightarrow > 0 \rightarrow \cup$ MINIMUM TURNING PT. $\therefore$ CONCAVE DOWN

for point $(-1, 3)$, $y'' = 6(-1) + 2 = -4 \rightarrow < 0 \rightarrow \cap$ MAXIMUM T.P. $\therefore$ CONCAVE UP

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so, point A is concave up, with $x = -1$

iii. $x^3 + x^2 - x + 2 = k$

~~Bm~~ $x(x^2 + x - 1) + 2 = k$

$x(x \quad)(x \quad) + 2 = k$

$3x^2 \cancel{+ x^3} - 1 = k$