

## Question 6

a)  $a=1$   $d=5$   $n=60$

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

$$= 294$$

ii)  ~~$\frac{n}{2}$~~   $\frac{n}{2} (a + 294)$

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

$$= 8790$$

b)  $\ln 1.23 = \alpha$

$$\alpha = 0.207014169$$

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

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

When  $\frac{dy}{dx} = 0$

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

~~$3x^2 + 2x - 1$~~

~~$(3x + 1)(x - 1)$~~

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times -1}}{2 \times 3}$$

$$= \frac{-2 \pm 4}{6}$$

$$x = \frac{1}{3}, -1$$

Sub  $x$  into  $y$  to find  $y$

When  $x = \frac{1}{3}$

$$y = \frac{1}{3}^3 + \frac{1}{3}^2 - \frac{1}{3} + 2$$

$$= \frac{1}{27} + \frac{1}{9} - \frac{1}{3} + 2$$

$$= 1\frac{22}{27}$$

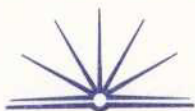
When  $x = -1$

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

$$= 1\frac{2}{3}$$

Point A  $(-1, 1\frac{2}{3})$  B  $(\frac{1}{3}, 1\frac{22}{27})$

||



$$\text{ii) } \frac{d^2y}{dx^2} = 6x + 2$$

when  $x < 0$

because when  $\frac{d^2y}{dx^2} < 0$  it equals  $\neq$  concave up

$$\text{iii) } x^3 + x^2 - x + 2 = k$$

~~$x^3 + x^2 - x + 2 = k$~~