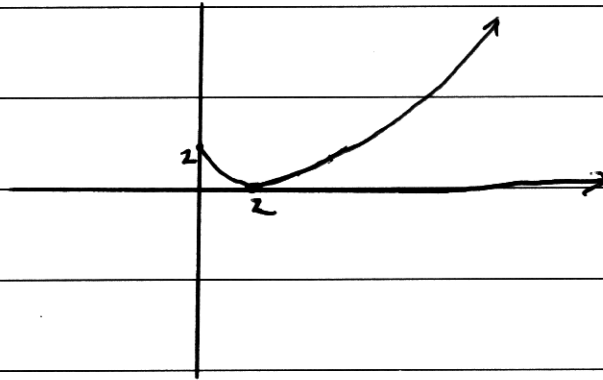


Q9/0(i) $y = \ln(x-1)$



(ii) $\int_2^4 \ln(x-1) dx$

$$A = \frac{1}{2} [f(2) + 2f(3) + f(4)]$$

$$= \frac{1}{2} [0 + 2\ln 2 + \ln 3]$$

$$\approx 1.24$$

(b) 5000 at 8.75% for 20 years

5000 at 8.75% for 19 years

↓

5000 at 8.75% for 1 year

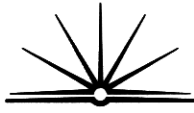
$$A = 5000(1.0875)^1 + 5000(1.0875)^2 + \dots + 5000(1.0875)^{20}$$

$$A = 5000 \left(1.0875 + 1.0875^2 + \dots + \cancel{5000} (1.0875)^{20} \right)$$

geometric series

$$A = 5000 \left(\frac{1.0875(1.0875^{20} - 1)}{1.0875 - 1} \right)$$

$$= \$270498.72$$



(c)(i) $V_1 = 10t$

(ii) @ $t = 5$ $V_1 = 10t$

$$V = 2t^2$$

$$x = \int 10t \, dt$$

$$x = \int 2t^2 \, dt$$

$$x = 5t^2 + c$$

$$x = \frac{2}{3}t^3 + c$$

$$x = 5t^2$$

$$x = \frac{2}{3}t^3$$

$$x = 5 \times 5^2$$

$$x = \frac{2}{3} \times 5^3$$

$$x_1 = 125 \text{ m}$$

$$x_2 = 83 \frac{1}{3}$$

$$125 - 83 \frac{1}{3}$$

$$= 41 \frac{2}{3} \text{ metres}$$

Jet is $41 \frac{2}{3}$ metres behind the car.

(iii) $x_1 = x_2$

$$5t^2 = \frac{2}{3}t^3$$

$$\frac{5}{\frac{2}{3}} = \frac{2}{3}t$$

$$\frac{5 \times 3}{2} = t$$

$$\frac{15}{2} = t$$

Jet catches car after 7.5 seconds.