

Start here for
Question Number: **4**

a) (i) ~~$a = 1000$~~ d

$$a = 1 \text{ km} \quad d = 0.75 \text{ km}$$

$$T_9 = 1 + (9-1) \times 0.75 \\ = 7 \text{ km}$$

(ii) $10 = 1 + (n-1) \times 0.75$

$$9.75 = 0.75n$$

$$n = 13$$

13th week

(iii) $S_{26} = \left(\frac{13}{2} (1+10) \right) + (10 \times (26-13))$

$$= 201.5 \text{ km}$$

b) Area = $\int_0^2 e^{2x} dx - \int_0^2 e^{-x} dx$

$$= \left[\frac{1}{2} e^{2x} \right]_0^2 - \left[-e^{-x} \right]_0^2$$

$$= \left(\frac{e^4}{2} - \frac{1}{2} \right) - \left(-\frac{1}{e^2} - 1 \right)$$

$$= \frac{e^4}{2} + \frac{1}{e^2} + \frac{1}{2} \text{ units}^2$$

c) (i) $P = \frac{1}{3} \times \frac{3}{11} = \frac{1}{11}$

(ii) $P = \frac{1}{11} \times 3 = \frac{3}{11}$

(iii) $P = 1 - \frac{3}{11} = \frac{8}{11}$

$$d) f(x) = 1 + e^x$$

$$f(-x) = 1 + \frac{1}{e^x}$$

$$f(x) \times f(-x) = f(x) + f(-x)$$

$$\begin{aligned} \text{LHS} &= f(x) \times f(-x) \\ &= (1 + e^x) \left(1 + \frac{1}{e^x}\right) \\ &= 1 + e^x + \frac{1}{e^x} + 1 \\ &= 2 + e^x + \frac{1}{e^x} \end{aligned}$$

$$\begin{aligned} \text{RHS} &= f(x) + f(-x) \\ &= (1 + e^x) + \left(1 + \frac{1}{e^x}\right) \\ &= 2 + e^x + \frac{1}{e^x} \end{aligned}$$

$$= \text{LHS}$$

Additional writing space on back page.