

$$a.) \quad y = e^{2x} \quad (0,1)$$

$$y' = 2e^{2x}$$

$$\text{when } x = 0$$

$$y' = 2e^0 \\ = 2$$

$$y - 1 = 2(x)$$

$$y - 1 = 2x$$

$$-2x + y - 1 = 0$$

$$2x - y + 1 = 0$$

$$b.) \quad i.) \quad y = x \sin x$$

$$y' = x \cos x$$

$$ii.) \quad y = \frac{\ln x}{x^2}$$

$$\frac{u'v - uv'}{v^2}$$

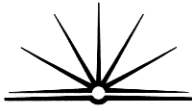
$$u = \ln x \quad u' = \frac{1}{x}$$

$$y' = \frac{x^2 \times \frac{1}{x} - \ln x \times 2x}{(x^2)^2}$$

$$v = x^2 \quad v' = 2x$$

$$= \frac{\frac{x^2}{x} - 2x \ln x}{x^4}$$

$$= \frac{1 - 2x \ln x}{x^4}$$



c.)  $\angle YZX = 75^\circ$  (angle sum of triangle)

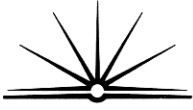
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{4}{\sin 45^\circ} = \frac{x}{\sin 60^\circ}$$

$$\frac{4}{\frac{1}{\sqrt{2}}} = \frac{x}{\frac{\sqrt{3}}{2}}$$

$$\frac{x}{\frac{\sqrt{3}}{2}} \times \frac{1}{\sqrt{2}}$$

$$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2}$$



$$d.) \quad i.) \int \cos 3x \, dx$$

$$= \frac{1}{3} \sin 3x + C$$

$$ii.) \int_0^1 (e^{5x} - 1) \, dx$$

$$= \left[ \frac{1}{5} e^{5x} - x \right]_0^1$$

$$= \left( \frac{1}{5} e^5 - 1 \right) - \left( \frac{1}{5} e^0 - 0 \right)$$

$$= 28.68263182 - \frac{1}{5}$$

$$= 28.48263182$$

$$\approx 28.49 \text{ (to 2 d.p.)}$$

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