

Start here for
Question Number: **2**

$$a) \frac{\cos x}{x} \quad u = \cos x$$

$$u' = -\sin x$$

$$v = x$$

$$v' = 1$$

$$v^2 = x^2$$

$$\frac{dy}{dx} = \frac{vu' - uv'}{v^2}$$

$$= \frac{(x \cdot \sin x) - (\cos x \cdot 1)}{x^2}$$

$$= \frac{x \sin x - \cos x}{x^2}$$

$$b) x^2 - x - 12 < 0$$

$$(x^2 - 4)(x + 3) < 0$$

$$x = 4, -3$$

$$c) y = \ln(3x) \quad x = 2$$

$$y - y_1 = m(x - x_1)$$

$$y - \ln(3x) = m(x - 2)$$

$$m = 3$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \ln(3x)$$

$$= \ln 6$$

$$= 1.79$$

$$d) i. \int \sqrt{5x+1} dx$$

$$= \int \frac{1}{2} (5x+1) dx$$

$$= \frac{1}{2} \left(\frac{5x^2}{2} + 1x \right) + C$$

$$= \frac{5x^2}{4} + \frac{x}{2} + C$$

$$5x^{1/2} + 1x^{1/2} + C$$

$$= \frac{5x^{1/2}}{1/2} + \frac{1x}{1/2} + C$$

$$= 10x^{1/2} + 2x + C$$

$$\text{ii } \int \frac{x}{4+x^2} dx$$

$$= \int \frac{x(2+x^{-2})}{4} dx$$

$$= \frac{x^2}{4(2)} + \frac{x^{-1}}{-1} + C$$

$$= \frac{x^2}{8} + x + C$$

$$\text{e). } \int_0^6 (x+k) dx = 30 \quad k = \text{constant.}$$

$$\int_0^6 \left(\frac{x^2}{2} + k \right) dx = 30$$

$$\left(\frac{36(6)^2}{2} + k(6) \right) \frac{1}{2} = 30$$

$$= \left(\frac{36 \cdot 36}{2} + 6k \right) = 30$$

$$= 18 + 2k = 30$$

$$2k = 12$$

$$k = 6$$

Additional writing space on back page.