

Start here for

Question Number: **2**

$$a) \frac{\cos x}{x^2} \quad u \quad v$$

$$u = \cos x$$

$$u' = -\sin x$$

$$v = x^2$$

$$v' = 2x$$

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

$$= \frac{x(-\sin x) - \cos x(2x)}{x^4}$$

$$= \frac{-x \sin x - 2 \cos x}{x^3}$$

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

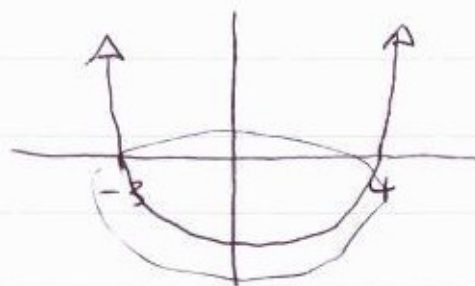
$$\begin{array}{r} 6 \ 12 \ 3 \\ 2 \ 1 \ -4 \end{array}$$

$$\begin{array}{r} x \quad -4 \\ x \quad +3 \end{array}$$

$$-4x + 3x = -x$$

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

$$\therefore -3 < x < 4$$



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

$$y' = \frac{\frac{1}{3}}{3x}$$

$$= \frac{1}{6} \text{ when } x = 2$$

$$\frac{1}{6}$$

$$M = \frac{1}{6}$$

~~copy of answer~~
y = ln 6 =

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

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

$$\left[\frac{(5x+1)^{\frac{3}{2}}}{\frac{3}{2}} \right] + C$$

$$= \frac{2(5x+1)^{\frac{3}{2}}}{3} + C$$

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

$$= 2 \int \frac{x}{4+x^2}$$

$$2 \log_e(4+x^2) + C$$

$$e) \int_0^6 (x+k) \, dx = 30$$

$$\left[\frac{x^2}{2} + kx \right]_0^6$$

$$\frac{6^2}{2} + k(6) - \frac{0^2}{2} + k(0)$$

$$k = 2$$

$$18 + 6k = 30$$

$$6k = 12$$

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