

Start here for
Question Number: **2**

a. $\frac{\cos x}{x}$

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

$$\begin{array}{l} u = \cos x \\ u' = -\sin x \end{array} \quad \begin{array}{l} v = x \\ v' = 1 \end{array}$$

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

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

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

$$x < 4 \quad x < -3$$

$$-3 < x < 4$$

c. $y = \ln(3x)$ $x=2$
 $y' = \frac{1}{x} \cdot \frac{3}{3x}$

when $x=2$

$$\frac{3}{6} = \underline{\underline{\frac{1}{2}}}$$

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

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

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

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

ii. $\int \frac{x}{4-x^2} dx$

$$\frac{1}{2} \int \frac{2x}{4-x^2} dx$$

$$\frac{1}{2} \left[\ln(4-x^2) \right] + C$$

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

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

$k = \text{constant}$

$$\left[\frac{x^2}{2} + kx \right]_0^6 = 30$$

$$\left[\frac{36}{2} + 6k - 0 - 0 \right] = 30$$

$$18 + 6k = 30$$

$$6k = 12$$

$$k = \frac{12}{6} = \underline{\underline{2}}$$

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