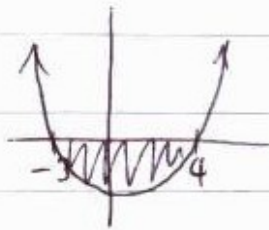


Start here for
Question Number: **2**

$$\begin{aligned}
 \text{a) } \frac{d}{dx} \frac{\cos x}{x} &= \frac{x \cdot -\sin x - \cos x \cdot 1}{x^2} \\
 &= \frac{-(x \sin x + \cos x)}{x^2}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } x^2 - x - 12 < 0 \\
 (x-4)(x+3) < 0
 \end{aligned}$$



$$x - 3 < x < 4$$

$$\begin{aligned}
 \text{c) } y &= \ln(3x) \\
 \frac{dy}{dx} &= \frac{1}{3x} \times 3 \\
 &= \frac{1}{x}
 \end{aligned}$$

$$\text{at } x=2$$

$$\frac{dy}{dx} = \frac{1}{2}$$

gradient of tangent at $x=2$ is $\frac{1}{2}$.

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

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

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

$$= \frac{2(5x+1)^{\frac{3}{2}}}{15} + C$$

$$\begin{aligned} \text{ii} \quad & \int \frac{x}{4+x^2} dx \\ &= \frac{1}{2} \int \frac{2x}{4+x^2} dx \\ &= \frac{1}{2} \ln(4+x^2) + C \end{aligned}$$

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

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

$$18 + 6k - (0 + 0) = 30$$

$$6k = 30 - 18$$

$$6k = 12$$

$$k = 2.$$

Additional writing space on back page.