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

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

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

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

$\therefore \quad x = -3 \text{, or } 4$

c) $y = \ln(3x)$ $\ln = \dfrac{1}{x}$

$y' = \dfrac{3}{x}$

where $x = 2$

$m = \dfrac{3}{2} = 1\frac{1}{2}$

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

$\quad = \int (5x+1)^2 \, dx$

$\quad = \int (5x+1)(5x+1) \, dx$

$\quad = \int 25x^2 + 10x + 1 \, dx$

$\quad = \dfrac{25x^3}{3} + \dfrac{10x^2}{2} + x + c$

$\quad = \dfrac{25x^3 + 5x^2 + x + c}{3}$

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

$x(4 + x^{-2})$

$= \dfrac{x^2}{2}\left(x + \dfrac{x^{-3}}{-3} \right) + c$

$= \dfrac{x^2}{2}\left(x - \dfrac{x^{-3}}{3} \right) + c$

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e)

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

$$30 = \left(\frac{x^2}{2} + k\right)_0^6$$

$$30 = \left(\frac{6^2}{2} + 6k\right) - \left(\frac{0^2}{2} + k\right)$$

$$18 + k -$$