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

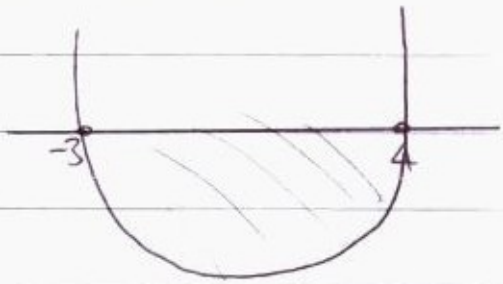
$\frac{d}{dx} = \frac{(x\sin x) - \cos x}{x^2}$

+S
+C
-S
-C
+S

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

$x \quad -4 \quad 3$

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



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

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

$\frac{dy}{dx} = \frac{3}{3x}$

$y = \ln(6)$

At $x = 2$.

$\frac{dy}{dx} = \frac{3}{6}$

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

$\therefore \quad y - \ln 6 = \frac{1}{2}(x-2)$

$2y - 2\ln 6 = x - 2$

$= x - 2y - 2 + 2\ln 6$

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

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

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

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

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

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

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

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

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

$\therefore 18 + 6k = 30$

$6k = 12$

$k = 2.$

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