Start here for Question Number: 2

2a) $\int \frac{\cos x}{x}\,dx$ = Use quotient rule to differentiate.

Let $u = \cos x$ $\quad v = x$

$u' = -\sin x$ $\quad v' = 1$

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

$= \frac{\cos x + x\sin x}{x^2}$

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

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

$\therefore x = -3$ in $4 < 0$

or 4 in < 0 ✗ impossible.

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

$y' = \frac{1}{3x}$ when $x = 2$

$y' = \frac{1}{3(2)}$

$= \frac{1}{6}$

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

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

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

$= \frac{\sqrt[3]{2(5x+1)}}{2} + C$

dii) $\int \frac{x}{4+x^2}\,dx = \frac{x^2}{4+2x^2} + C$

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

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

$= x$

$= \frac{x^3}{7} + C$

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

$30 = \left[x^2 + k^2 x\right]_0^6$

$30 = \left[(6^2 + k(6)) - (0^2 + k(0))\right]$

$30 = (36 + 6k) - (0)$

$30 - 36 = 36 + 6k - 36$

$\frac{-6}{6} = \frac{6k}{6}$

$-1 = k$

$\therefore k = -1$ This is true as when $k = -1$

$\int_0^6 (x + k - 1)\,dx = \left[x^2 + -x\right]_0^6$

$= \left[((6)^2 + -(6)) - ((0)^2 + -1(0))\right]$

$= 30 - 0$

$= 30$

Additional writing space on back page.