Start here for Question Number: 2

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

$= \frac{x.-\sin x - \cos x.1}{x^2}$

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

+1S
+1C
−S
−C
+S

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

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

$\therefore -3 < x < 4$

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

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

$= \frac{1}{x}$

at $x = 2$: $y' = \frac{1}{2}$

$\therefore$ gradient is $\frac{1}{2}$

sub in $x = 2$ into y for y co-ordinate:

$y = \ln(3 \times 2)$

$= \ln 6$

$(2, \ln 6)$

~~$y - y_1 = m(x - x_1)$~~

$y - y_1 = m(x - x_1)$

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

d.

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

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

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

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

ii. $= \frac{1}{2}\int \dfrac{2x}{x^2+4}\, dx$

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

e. $\int_0^6 (x+k)\, dx = \left[\frac{x^2}{2} + xk\right]_0^6$

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

$= 18 + 6k$

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

$\therefore 18 + 6k = 30$

$6k = 30 - 18$

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$6k = 12$

$\therefore k = 2$

You may ask for an extra Writing Booklet if you need more space to answer question 2.