Start here for
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(a) $y = \dfrac{\cos x}{x}$

$y' = \dfrac{v\,u' - u\,v'}{v^2}$

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

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

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

$x = 4, -3$

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

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

$a + x = 2$

$gradient = \dfrac{1}{2}$

(d) (i) $\displaystyle \int (5x + 1)^{\frac{1}{2}} \cdot dx$

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

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

(d) (ii)
$$\int \frac{x}{4 + x^2} \, dx$$

$$= \int x \left(4 + x^2\right)^{-1} \, dx$$

$$= \frac{\frac{x^2}{2}}{4x + \frac{x^3}{3}} + c$$

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

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

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

$$18 + 6k = 30$$

$$6k = 12$$

$$k = 2$$

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