Question 3

3a. $\int_0^1 \frac{dx}{x+4}$

$=$

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3b. $S = kM^{\frac{2}{3}}$

$18600 = k \times 70^{\frac{2}{3}}$

$k = 263\frac{11}{53}$

$S = 263\frac{11}{53} \times 60^{\frac{2}{3}}$

$= 15968$ (5 sig fig).

3ci. let $y = \ln(x^2 - 9)$ $\quad u = \ln \quad u' = \frac{1}{x}$

$y' = uv' + vu' \quad v = x^2 + 9 \quad v' = 2x$

$= \ln \times 2x + (x^2 + 9) \times \frac{1}{x}$

$= 2\ln x + x + \frac{9}{x}$

$= 2\ln x + 9$

3c ii.

let $y = \frac{x}{e^x}$

$y' = \frac{vu' - uv'}{v^2}$ $\quad u = x \quad u' = 1$

$v = e^x \quad v' = e^x$

$= \frac{e^x \times 1 - x \times e^x}{(e^x)^2}$

$= \frac{e^x - xe^x}{(e^x)^2}$

$= \frac{e^x - x}{e^x}$

$= -x$

3d. $c^2 = a^2 + b^2 - 2ab\cos C$