

$$a) \int_0^1 \frac{dx}{x+4} \approx$$

$$= \int_0^1 \frac{1}{x+4} dx$$

$$= \left[\ln(x+4) \right]_0^1$$

$$= \ln 5 - \ln 4$$

$$= 0.22 \text{ (to 2 decimal places)}$$

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

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

$$k = \frac{18600}{\sqrt[3]{70^2}}$$

$$= 16.98 \text{ (to 2 decimal places)}$$

When $M = 60$

$$S = k 60^{\frac{2}{3}}$$

$$= 260 \text{ cm}^2 \text{ (to nearest cm, using calculator memory for } k)$$

c) (i) if $y = \ln(x^2 - 9)$

$$\frac{dy}{dx} = \frac{2x}{\ln(x^2 - 9)}$$

(ii) $\frac{u}{v}$

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

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

$$= e^x \left(\frac{1-x}{e^x} \right)$$

d) $a^2 = b^2 + c^2 - 2bc \cos A$

~~then~~

$$13^2 = x^2 + 7^2 - 2 \cdot x \cdot 7 \cos 60^\circ$$

$$169 = x^2 + 49 - 14x \cdot \frac{1}{2}$$

$$120 = x^2 - 7x$$

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$$x^2 - 7x = 120 \quad \text{QED} \quad \rightarrow$$

d) cont'd)

$$x^2 - 7x = 120$$
$$x(x - 7) = 120$$
$$x = 12$$