

Q3.

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

~~$\int_0^1 \frac{1}{(x+4)^2} dx$~~

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

$= [\ln 5 - \ln 4]$

$= \ln 1$

$= 0$

b) $SA = kM^{2/3}$

$M = \text{Mass}$

$k = \text{constant of proportionality}$

$M = 70 \text{ kg} \quad SA = 18600$

$\therefore 18600 = k 70^{2/3}$

$k = 1095.08$ or $\frac{18600}{70^{2/3}}$

$M = 60$

$SA = 1095.08 (60)^{2/3}$

$= 16783.47$ 2dp.

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

(ii) $\frac{x}{e^x}$

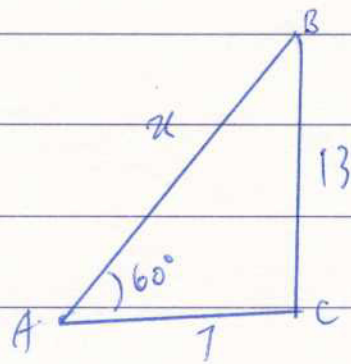
$y' = \frac{2x}{x^2-9}$

$= x e^{-x}$

$= \frac{2x}{(x-3)(x+3)}$

$y' = e^{-x} + x e^{-x}$

$= e^{-x}(1+x)$



$$x^2 - 7x = 120 \quad \text{and } x = ?$$

cos b

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

$$a^2 = \frac{b^2 + c^2 - \cos A}{2bc}$$

~~$$b^2 = \frac{a^2 + c^2 - \cos B}{2ac}$$~~

~~$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$~~

~~$$c^2 = \frac{b^2 + a^2 - \cos C}{2ab}$$~~

$$a^2 = \frac{b^2 + c^2 - \cos A}{2bc}$$

~~$$c^2 = \frac{b^2 + a^2 - \cos C}{2ab}$$~~

~~$$x^2 = \frac{7^2 + 13^2 - \cos C}{2(7)(13)}$$~~

~~cos~~

$$13^2 = \frac{7^2 + x^2 - \cos 60}{\frac{1}{2}}$$

~~$$\frac{4732}{49} = \frac{218 - \cos C}{182}$$~~

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

~~$$17576 = 218 - \cos C$$~~

$$2366x = \frac{49x^2}{2}$$

~~$$17358 = -\cos C$$~~

$$4732x = 49x^2$$

~~$$\cos C = -17358$$~~

$$4732 = 49x$$

$$x = \frac{4732}{49} \quad \text{— exact value.}$$

$$x = 96.57 \text{ — 2dp}$$

$$x^2 - 7x = 120 \quad a^2 = \frac{b^2 + c^2 - 2bc \cos A}{2bc}$$

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

$$\cos A = \frac{b^2 + c^2 - 2a^2bc}{2bc}$$

$$\frac{1}{2} = \frac{49 + x^2 - 2 \times 13^2 \times 7 \times x}{2 \times 13^2 \times 7 \times x}$$

$$= \frac{49 + x^2 - 2366x}{2366x}$$

$$= \frac{49 + x^2 - 4732x}{4732x}$$

$$2x^2 - 4732x = 98$$

$$2x^2 - 4732x = 98$$

$$x^2 - 2366x = 49$$