



(a)

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

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

$$= \log_e(1+4) - (\log_e(0+4))$$

$$= \log_e 5 - \log_e 4$$

$$= \log_e\left(\frac{5}{4}\right)$$

(b)

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

When $M = 70$, $k = ?$, $S = 18600$

$$\therefore 18600 = k70^{\frac{2}{3}}$$

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

$$= 1095.08438$$

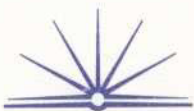
$$= 1095.08 \text{ (to 2dp)}$$

\therefore To find S when $M = 60$,

$$S = 1095.08438 \times 60^{\frac{2}{3}}$$

$$= 16783.469\dots \text{ (by calc)}$$

$$= 16783 \text{ cm}^2 \text{ (to nearest cm}^2\text{)}$$



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

$$\therefore f'(x) = \frac{2x}{x^2 - 9}$$

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

$$\therefore f'(x) = \frac{u'v + v'u}{v^2}$$

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

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

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

~~$\therefore x^2 = 7^2 + 13^2 - 2 \times 7 \times 13$~~

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

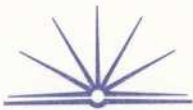
$$169 = x^2 + 49 - 14x \cos 60^\circ$$

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

$$= x^2 + 49 - 7x$$

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

~~$\sqrt{x(x-7)} = 120$~~ (d) continued next page..



$$\therefore x^2 - 7x - 120 = 0$$

$$(x-15)(x+8) = 0$$

$$\therefore x = -8 \text{ or } 15$$

But a distance cannot be negative,

$$\therefore x = 15 \text{ cm}$$