



04 a) $3x^2 + 2x + k = 0$ no real roots $\Delta < 0$

$$a=3$$

$$b=2$$

$$c=k$$

$$\Delta = b^2 - 4ac$$

$$= 4 - 4(3k)$$

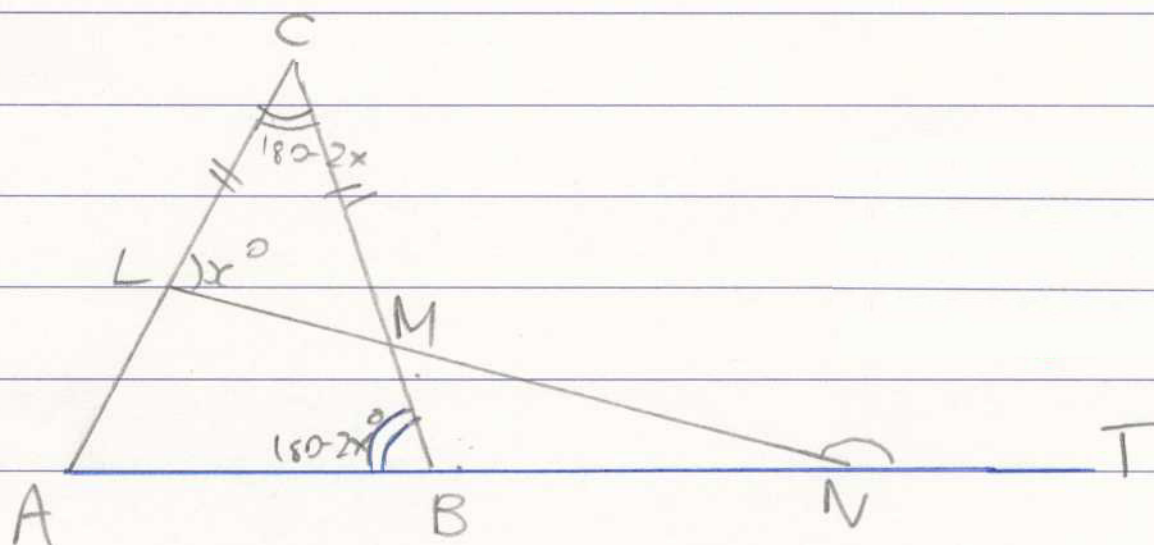
$$\Delta = 4 - 12k$$

$$4 - 12k < 0$$

$$-12k < -4$$

$$k > \frac{1}{3}$$

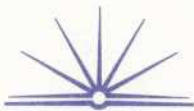
b)



i) let $\angle ABC = x$

$\triangle ABC = \text{isos}$ $\therefore \angle ACB = \angle ABC = x^\circ$ (base \angle 's)
(isos. \triangle)

$\therefore \angle ABC = 180 - 2x^\circ$ (\angle sum \triangle)



$$b) ii) \angle ACB = 180 - 2x \text{ (base } \triangle \text{'s isos } \triangle)$$

$$\angle AMN = (180 - 2x) + x = 180$$

$$\angle MNB = 180 - 2x$$

$$\angle MNC = x$$

$$\angle LMC = x^\circ \text{ (} \triangle CLM \text{ isos)}$$

$$\angle NMB = x^\circ \text{ (vert opp } \triangle \text{'s)}$$

let
 $\angle MBN = a$

$$\angle MBN = (180 - 2x) + a = 180$$

$$\angle MBN = 2x^\circ$$

$$\therefore \angle TNL = \angle NMB + \angle MBN \text{ (exterior } \triangle \text{ equals}$$

sum of opp. interior)

$$= 2x^\circ + x^\circ$$

$$= 3x^\circ$$

c) i) \angle

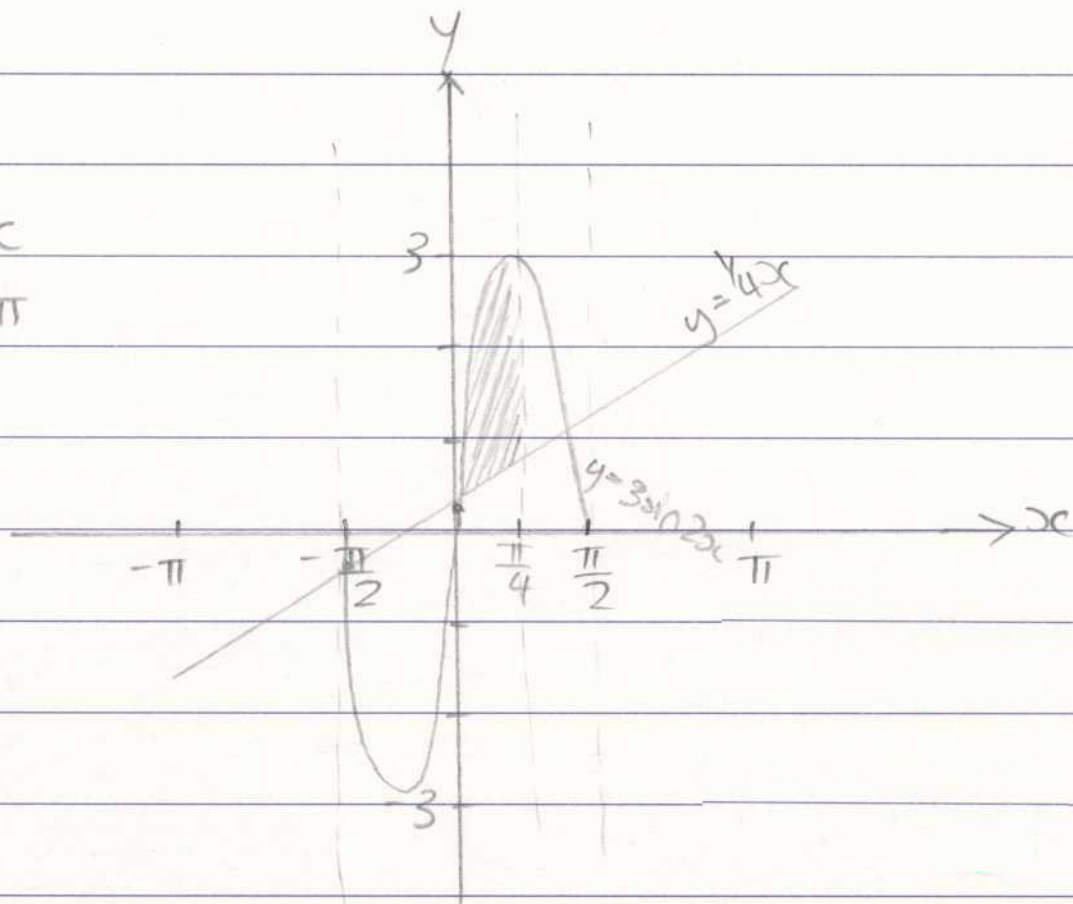


c) i)

$$y = 3\sin 2x$$

$$P = \frac{2\pi}{2} = \pi$$

$$a = 3$$



ii) $y = \frac{1}{4}x$

iii) $\int_0^{\pi/4} (3\sin 2x - \frac{1}{4}x) dx$

S +
C +
S -
C -
S +

$$\left[-6\cos 2x \right]_0^{\pi/4} - \frac{1}{4} \left[\frac{x^2}{2} \right]_0^{\pi/4}$$

$$\left[(-6\cos \frac{2\pi}{4}) - (-6\cos 0) \right] - \frac{1}{4} \left[\left(\frac{\pi}{4} \right)^2 - 0 \right]$$

$$= \left\{ (6 \times 0) - (-6) \right\} - \frac{1}{4} \left\{ \frac{\pi^2}{16} - 0 \right\}$$

$$= 6 - \frac{1}{4} \left\{ \frac{\pi^2}{32} \right\}$$

$$= 5 \frac{3}{4} \left\{ \frac{\pi^2}{32} \right\} \text{ units}$$

$$\frac{23}{4} \left(\frac{\pi^2}{32} \right) = \frac{23\pi^2}{128} \text{ units}$$