

4

a)  $3x^2 + 2x + k = 0$

$$\Delta = b^2 - 4ac < 0$$

$$= 2^2 - 4 \cdot 3 \cdot k < 0$$

$$= 4 - 12k < 0$$

$$-12k < -4$$

$$k > \frac{-4}{-12}$$

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

$$\begin{pmatrix} a=3 \\ b=2 \\ c=k \end{pmatrix}$$

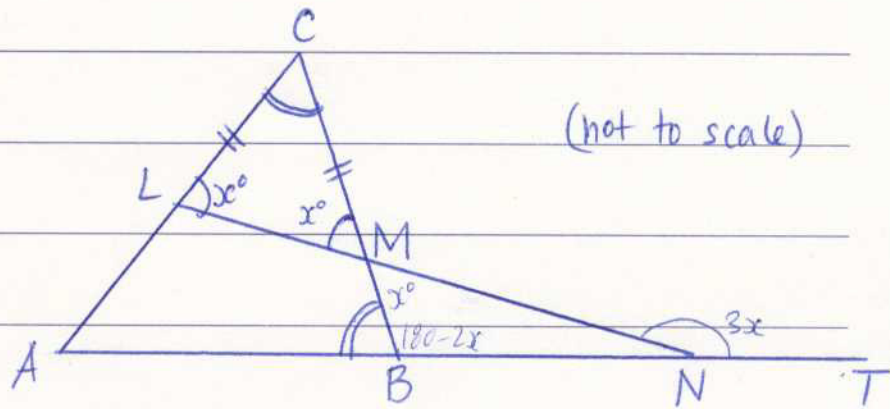
$$180 - x - 180$$

b)

$$\angle ABC = \angle ACB$$

$$CL = CM$$

$$\angle CLM = x^\circ$$



i)  $\angle ABC = 180 - 2x^\circ$

$$\angle CML = \angle CLM = x^\circ \text{ (base angles of isosceles } \Delta \text{ are equal)}$$

$$\therefore \angle LCM = 2x^\circ$$

$$\therefore \angle ABC = 2x^\circ$$

$$\therefore \angle ABC = 180 - 2x^\circ \text{ (co-interior angles are supplementary } = 180^\circ)$$

PTO →



ii)

$$\angle TNL = 3x^\circ$$

~~angle~~

~~$\angle TNL = 3x^\circ$~~

$\angle NMB = x^\circ$  (vertically opposite to  $\angle CML = x^\circ$ )

$\angle ABC = 2x^\circ \therefore \angle MBN$  is  $180 - 2x^\circ$

$$\Delta BNM = x + 180 - 2x + 180 - 3x = 180^\circ$$

$$-4x + 360^\circ = 180^\circ$$

$$-4x = \frac{180^\circ}{360^\circ} 180^\circ - 360^\circ$$

$$-4x = -180$$

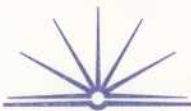
$$x = 45$$

$$\therefore \angle MNB = 45^\circ = x^\circ \quad (180 = 4x^\circ)$$

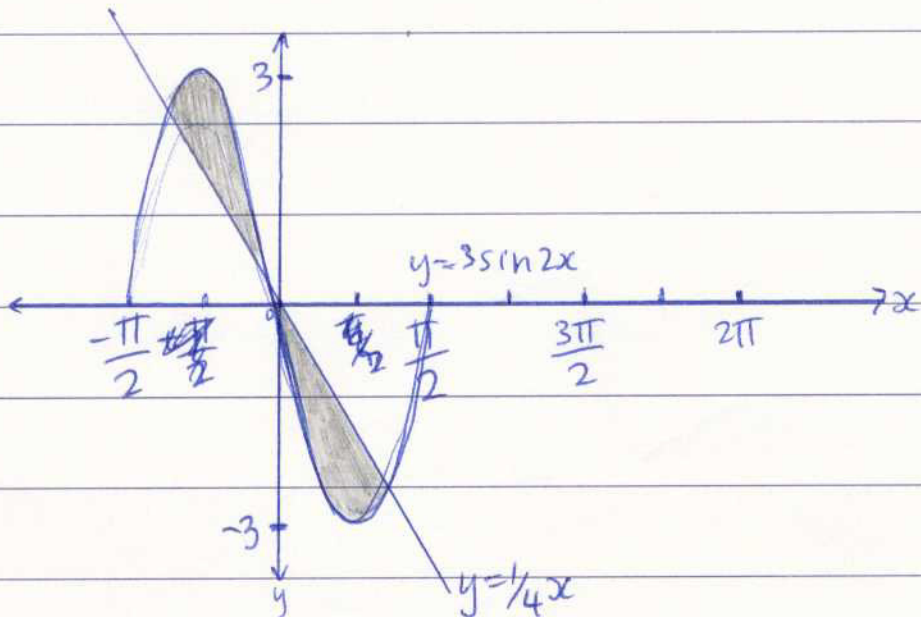
$$\therefore \angle TNL = 180 - x$$

$$180 - 3x + 3x = 180$$

$$4x - x = 3x^\circ$$



c) i)  $y = 3 \sin 2x$  for  $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$



ii)

iii)  $y = \frac{1}{4}x = \ln 4$   $x=0 \rightarrow y=0$   $y=0 \rightarrow x=0$   
 $4y = x$   $x=0 \rightarrow y=0$   $y=0 \rightarrow x=0$

$$\int_0^{\pi/4} \left( 3 \sin 2x - \frac{1}{4}x \right) dx$$
$$\left[ -\frac{3}{2} \cos 2x - \frac{1}{8}x^2 \right]_0^{\pi/4}$$
$$\left( -\frac{3}{2} \cos 2\left(\frac{\pi}{4}\right) - \frac{1}{8}\left(\frac{\pi}{4}\right)^2 \right) - \left( -\frac{3}{2} \cos 2(0) - \frac{1}{8}(0)^2 \right)$$
$$= (-\ln 4) - \left( -\frac{3}{2} - \ln 4 \right)$$
$$= -\ln 4 + \frac{3}{2} - \ln 4$$
$$= -\ln 8 + \frac{3}{2}$$