

Question 4

(a) $\Delta < 0$

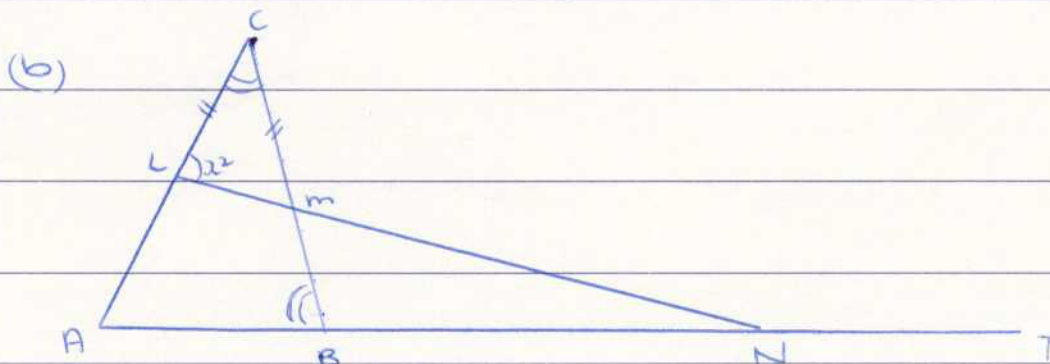
$$\Delta = b^2 - 4ac$$

$$2^2 - 4 \times 3 \times k < 0$$

$$4 - 12k < 0$$

$$12k < -4$$

$$k < -\frac{1}{3}$$



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

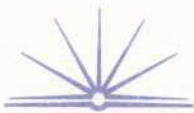
Because: $\triangle CLM$ is isosceles. ($CL = CM$)

\therefore base angles are equal $= x^\circ$

$$\begin{aligned} \angle LCM &= 180^\circ - 2x \text{ base angles} \\ &= 180^\circ - 2x^\circ \end{aligned}$$

Because $\angle LCM = \angle ABC$

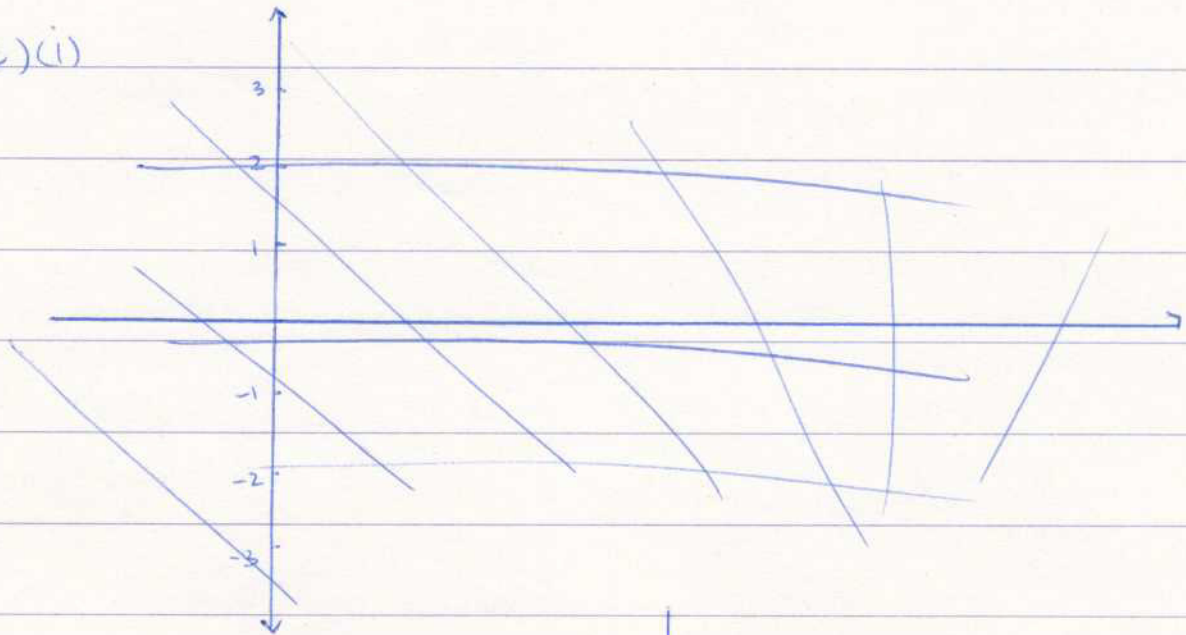
$$\therefore \angle ABC = 180^\circ - 2x^\circ$$



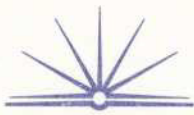
(ii) $\angle TNL = 3x^\circ$

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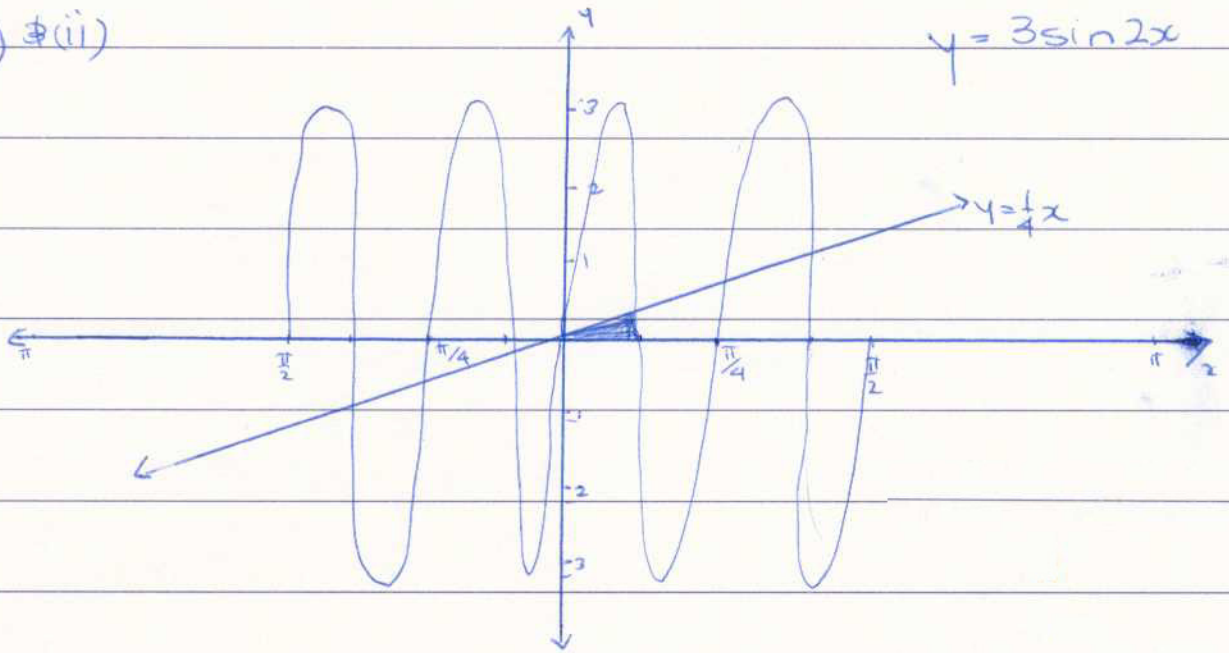
(c)(i)



P.T.O.



(c)(i) & (ii)



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

$$= \left[-\frac{3}{2} \cos 2x - \frac{1}{8}x^2 \right]_0^{\pi/4}$$

$$= \left[-\frac{1}{8} [12 \cos 2x - x^2] \right]_0^{\pi/4}$$

$$= -\frac{1}{8} \left[\left(12 \cos \frac{\pi}{2} - \frac{\pi}{4} \right) - (12 \cos 0 - 0^2) \right]$$

$$= -\frac{1}{8} \left[12 \cos \frac{3\pi}{4} \right]$$

$$= -\frac{1}{8} [12 \cos 270^\circ]$$

$$= 0$$