



a) ~~$3x^2 + 2x + k = 0$ (has no real roots)~~

~~$3 + 2 = -k$~~

~~$k = 5$~~

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

b) i) $\because \triangle CML$ is a \triangle

$\therefore \angle X = \angle CML$

$\therefore \angle ACB = 180^\circ - 2X^\circ$

hence $\angle ABC = \angle ACB$

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



$$ii) \angle CML = x^\circ$$

$$\therefore \angle BMN = x^\circ \text{ (opposite angles)}$$

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

$$\therefore \angle MNB = 180^\circ - [(180 - 180 - 2x) - 3x]$$

~~$$\angle LNF = 180^\circ - 3x$$~~

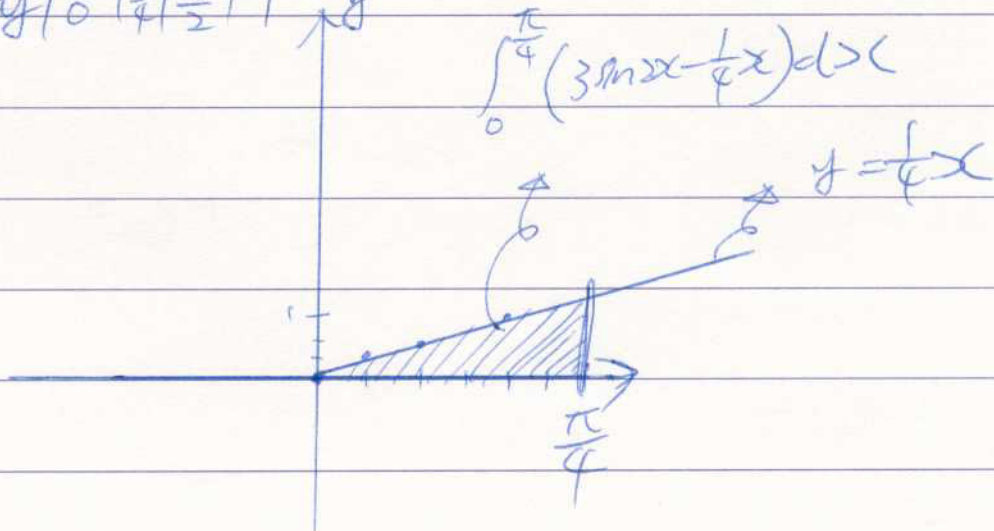
~~$$\angle TNL = 180^\circ - (180 - x)$$~~

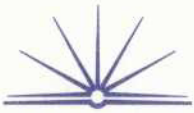
$$\angle TNL = 180^\circ - (180^\circ - 3x)$$

$$= 3x$$

c) i)

x	0	1	2	4
y	0	$\frac{1}{4}$	$\frac{1}{2}$	1





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

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

$$= \left(\frac{3}{2} \cos \frac{\pi}{2} - \frac{1}{8} \left(\frac{\pi}{4} \right)^2 \right) - \left(\frac{3}{2} \cos 0 - \frac{1}{8} \cdot 0 \right)$$

$$= \left(-1.5 - \frac{\pi^2}{128} \right) - \left(1.5 - 0 \right)$$

$$= -3 - \frac{\pi^2}{128}$$