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a) i) $m_2 = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{6 + 4}{12 + 2}$

$M.p = (5, 1)$ $(5, 1)$

ii) $m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{8 - 6}{6 - 12} = \dfrac{2}{-6}$

$= -\dfrac{1}{3}$

iii) $\angle CAB = \angle NAM$ (common angle) (A)

$m \text{ of } NM = \dfrac{2 - 1}{2 - 5} = -\dfrac{1}{3} = m \text{ of } CB$

∴ $NM \parallel CB$ ∴(A) $\angle ANM = \angle ACB$

(corresponding ∠s of ∥ lines

(A) similarly $\angle AMN = \angle ABC$ are equal)

∴ because all 3 angles are the same
triangle ABC is similar to $\triangle AMN$.

iv) MN

$$m = -\frac{1}{3} \qquad y_1 = 2 \qquad x_1 = 2$$

$$y - 2 = -\frac{1}{3}(x - 2)$$

$$y - 2 = -\frac{1}{3}x + \frac{2}{3}$$

$$3y - 6 = -x + 2$$

$$x + 3y - 8 = 0$$

v) $d = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$

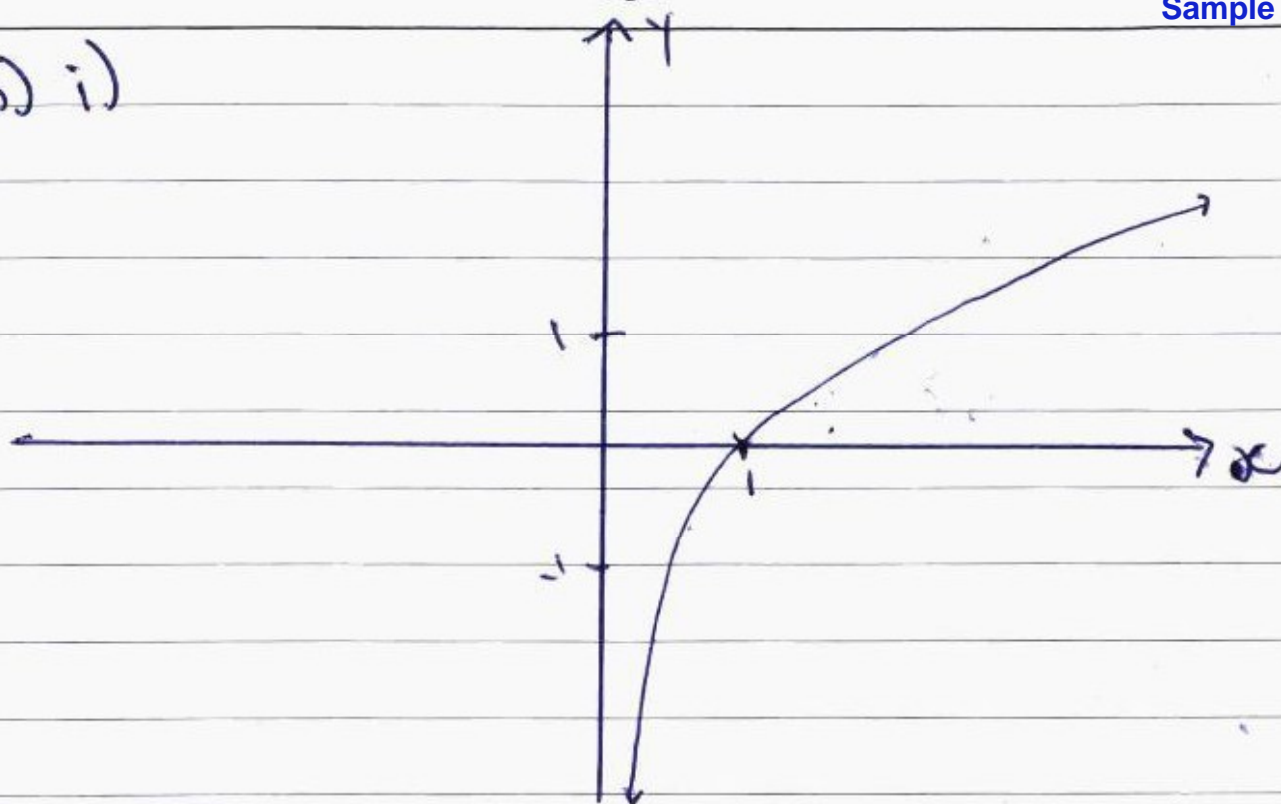$$= \sqrt{6^2 + (-2)^2}$$

$$= \sqrt{40}$$

$$= 2\sqrt{10}$$

vi) $A = \frac{1}{2} b \times h = 44$

$$\frac{1}{2} \times 2\sqrt{10} \times h = 44$$

$$\therefore h = \frac{44}{\sqrt{10}}$$

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b) i)

ii) $\dfrac{h}{2}\left(y_F + 2y_m + y_n\right)$ $h = 1$

x	1	2	3
y	0	0.693	1.099

$\dfrac{1}{2}\left(0 + 2(0.693) + 1.099\right)$

$A = 1.242 \text{ units}^2$

iii) ~~more~~ greater than
because $y = \ln x$ between $x = 1$ and $x = 3$
is concave down