Start here for
Question Number: **3**

a) i) $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ $A(-2, -4)$ $B(12, 6)$

$= \left(\frac{-2 + 12}{2}, \frac{-4 + 6}{2} \right)$

$= \left(\frac{10}{2}, \frac{2}{2} \right)$

$M = (5, 1)$

∴ Midpoint of AB is $(5, 1)$

ii)

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $B(12, 6)$ $C(6, 8)$

$= \frac{8 - 6}{6 - 12}$

$= \frac{2}{-6}$

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

∴ gradient of BC is $-\frac{1}{3}$

iii) $\angle AM = MB$ (Midpoint $5, 1$)

$\angle AN = NC$ (Midpoint $2, 2$)

∴ $\triangle ABC$ ||| $\triangle AMN$

iv)

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ $N\overset{x_1\,y_1}{(2,2)} M\overset{x_2\,y_2}{(5,1)}$

$= \dfrac{1-2}{5-2}$

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

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

$y - y_1 = m(x + x_1)$

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

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

$y = -\dfrac{1}{3}x + \dfrac{4}{3}$

v) $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $B\overset{x_1\,y_1}{(12,6)} C\overset{x_2\,y_2}{(6,8)}$

$= \sqrt{(6-12)^2 + (8-6)^2}$

$= \sqrt{(-6)^2 + (2)^2}$
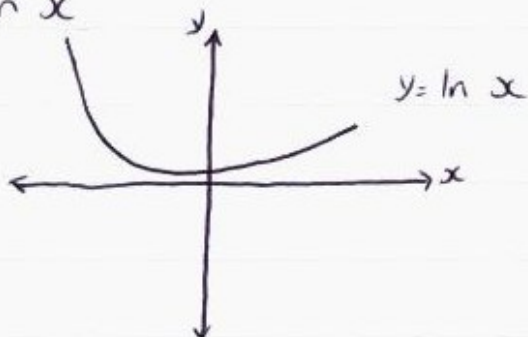
$= \sqrt{36 + 4}$

$= \sqrt{40}$

$= 6.32 \text{ units}^2$

P.T.O

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a) vi) $d = \dfrac{|ax_1 + by_1 + c|}{2a}$ $\overset{x_1 \, y_1}{B(12,6)} \; \overset{x_2 \, y_2}{C(6,8)}$

$= 1$

b) i) $y = \ln x$

$y = \ln x$

ii) $\dfrac{h}{2}(y_0 + y_1) + 2(y_2) + 4(y_3 + y_5)$

$\displaystyle\int_1^3 \ln x \; dx.$

$\left[\dfrac{1}{x}\right]_1^3$

$\left[\dfrac{1}{3}\right] - \left[\dfrac{1}{1}\right]$

$= \cancel{\text{////}} - \dfrac{2}{3}$

iii) It is less than. Sorry can't justify.