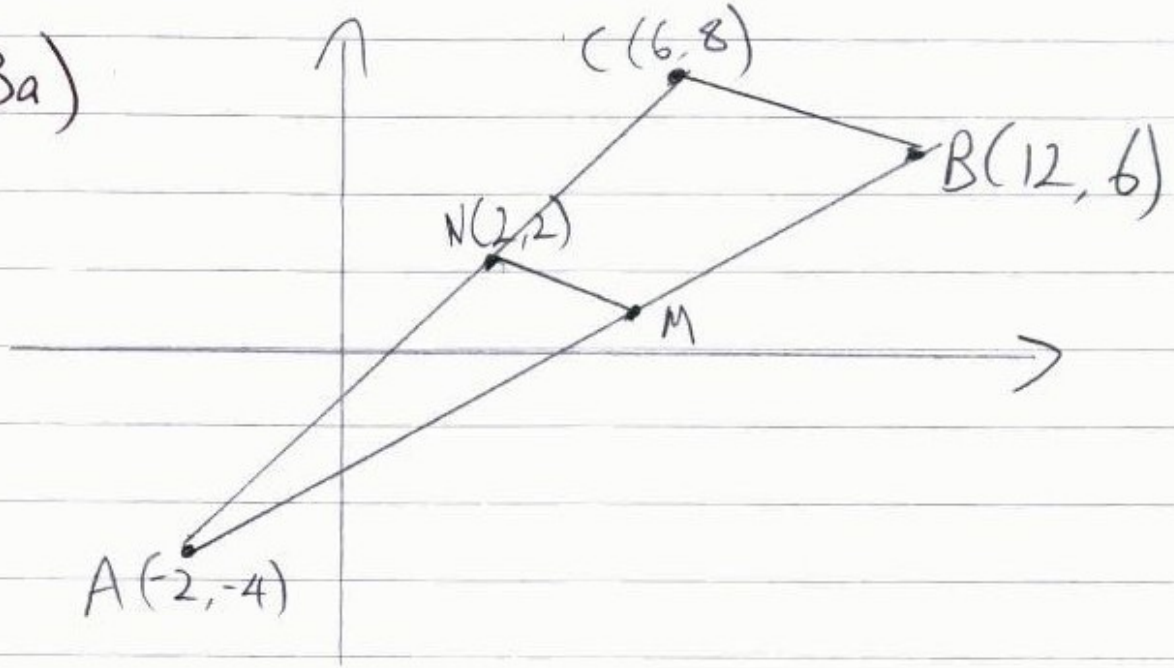
Start here for Question Number: 3

3a)



i) $M = \left(\frac{x_1+x_2}{2}\right), \left(\frac{y_1+y_2}{2}\right)$

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

$M = (5, 1)$

ii) $m_{BC} = \frac{y_2-y_1}{x_2-x_1}$

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

$= -\frac{2}{6} = -\frac{1}{3}$

iii) $\angle ANM = \angle ACB$ (similar $\angle$s are equal)

$\angle ABC = \angle AMN$ (similar $\angle$s are equal)

MN ∥ CB (parallel lines are similar

$\therefore \triangle ABC \,|||\, \triangle AMN$ (AAS)

iv) $y - y_1 = m(x - x_1)$ $(2, 2)$ $(5, 1)$

$m(MN) = \frac{y_2 - y_1}{x_2 - x_1}$

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

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

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

$3y - 6 = -(x - 2)$

$3y - 6 = -x + 2$

$x + 3y - 8 = 0$

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

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

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

$= \sqrt{36 + 4}$

$= \sqrt{40}$

vi) Perpendicular distance $\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$

$A(-2, -4)$ $3y - 8 = -\frac{1}{3}(x - 6)$

$3y - 24 = -(x - 6)$

$3y - 24 = -x + 6$

$x + 3y - 18 = 0$

$\therefore \frac{|1(-2) + 3(-4) - 18|}{\sqrt{(-2)^2 + (-4)^2}}$

Additional writing space on back page.

$$= \frac{|-2 - 12 - 18|}{\sqrt{20}}$$

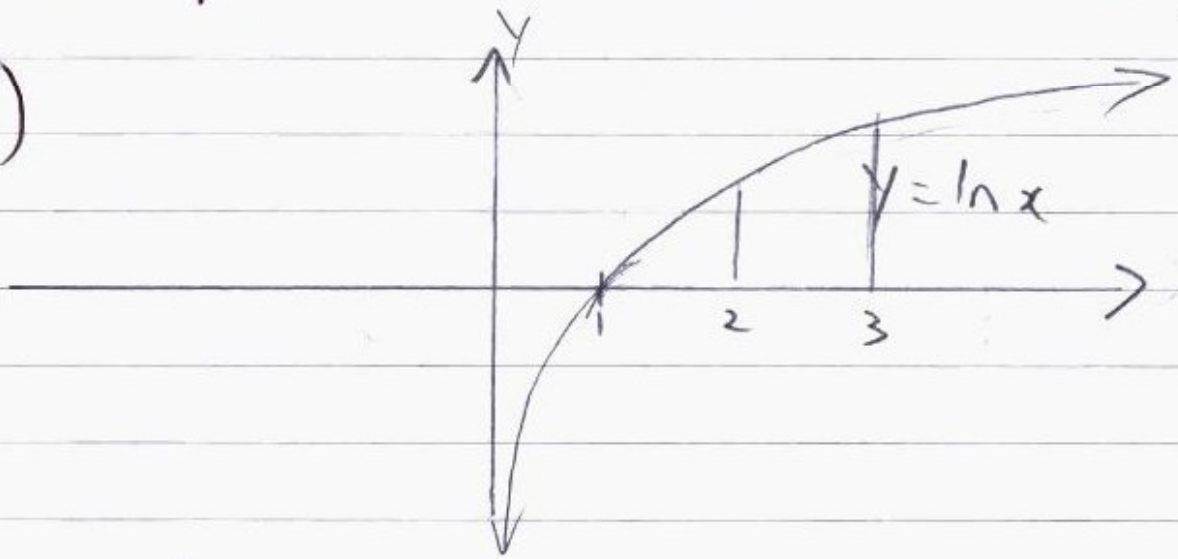
$$= \frac{-32}{\sqrt{20}}$$

$$= \frac{32}{\sqrt{20}} = \frac{32}{2\sqrt{5}} = 16\sqrt{5}$$

$\frac{1}{2} \times 2\sqrt{10}$

Perpendicular distance A to BC = $2\sqrt{45}$

bi)



ii) $\int_1^3 \ln x \, dx$

$b-a$

$\frac{h}{2}(y_0 + y_L + 2(y_1))$

$\frac{2}{2}(\ln 1 + \ln 3 + 2(\ln 2))$

$= 2.4849$

$\doteq 2.48$

iii) The approximation is greater than its exact value because ln2 & ln3 > 1 but less than 2

You may ask for an extra Writing Booklet if you need more space to answer question 3.