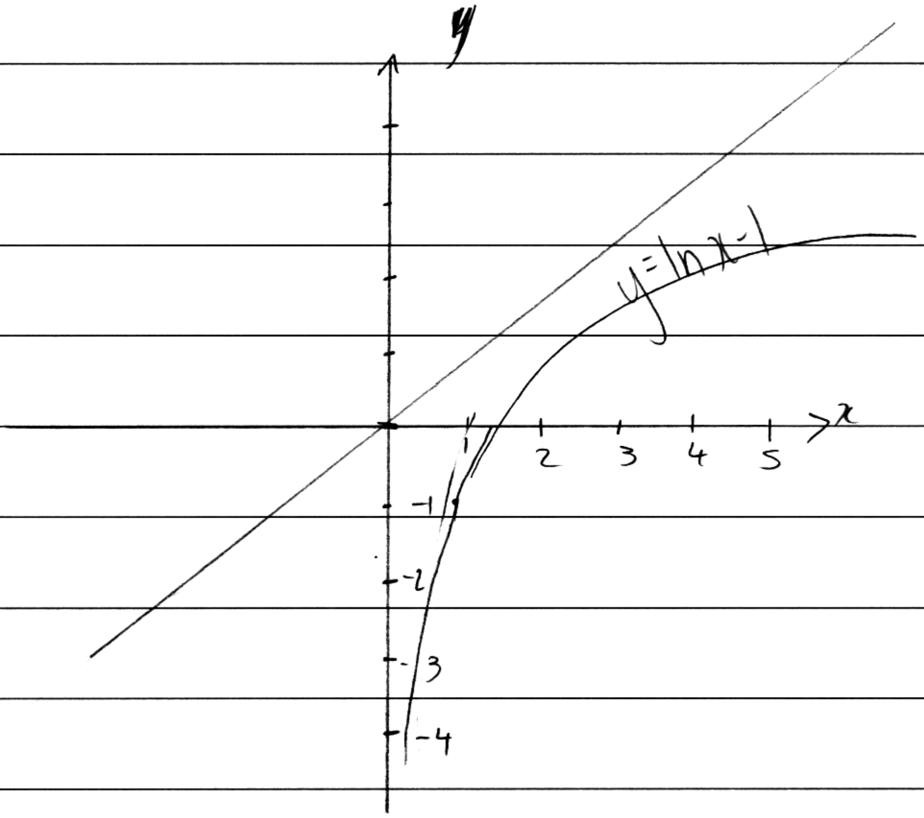
Question 9

BOARD OF STUDIES NEW SOUTH WALES

9a i).



ii $\int_a^b f(x)\,dx \doteqdot \frac{h}{3}\left[y_0 + y_n + 4(\text{odd}) + 2(\text{even})\right]$

$h = \frac{b-a}{n}$

$h = \frac{4-2}{2}$

$= \frac{2}{2}$

$= 1$

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9a ii

$\int_2^4 \ln(x-1)\,dx \doteqdot \frac{1}{3}\left[\cancel{2+4}(y=2)+(y=4)+4(y=3)\right]$

$\frac{1}{3}\left(\left(\ln(2-1)\right)+\left(\ln(4-1)\right)+4\left(\ln(3-1)\right)\right)$

$\frac{1}{3}\left[\ln 1+\ln 3+4(\ln 2)\right]$

$\frac{1}{3}\left(\ln 1+\ln 3+4\ln 2\right)$

$\frac{1}{3}\left(\ln 3+4\ln 2\right)$

$\doteqdot 1.290400337$

$\doteqdot 1.3 \cancel{(or}$ units^2 (one dec place)

9b. at December 2023, $t=20$.

$A = P \times \left(\frac{a(r^n-1)}{r-1}\right)$ $a=1$ $r=1+\frac{8.75}{100}$ $n=20$

$P=5000$

$= 5000 \times \left(\frac{1(1.0875^{20}-1)}{\cancel{0.0875}\ 0.0875}\right)$

$\doteqdot 248734.454$

$= \$248\ 734.45$ (2 dec places)

9c i $v_1 = kt$ (k is constant).

$v_2 = 2t^2$

at $t = 5$, $v_1 = 50$

$50 = kt$

$50 = k(5)$

$50 = 5k$.

$k = \frac{50}{5}$

$k = 10$.

$v_1 = 10t$

$x = \int v_1 \, dt$

ii $x = \frac{10t^2}{2} + c$

$= 5t^2$

at $t = 5$, c — travelled 150m.

car

$t = 0$, $x = 0$

$t = 1$ $x = 10$

$t = 2$ $x = 20$

$t = 3$ $x = 30$

$t = 4$ $x = 40$

$t = 5$, $x = 50$.

jet

$t = 1$ $x = 2$

$t = 2$, $x = 8$

$t = 3$, $x = 18$

$t = 4$ $x = 32$

$t = 5$ $x = 50$.

travelled 102 m.

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~~150~~

The jet is (150 m - 102 m) behind the car
= 48 m

~~a =~~ Car, (a) = 10.
jet (a) = 4t
4t = 10
$t = \frac{10}{4}$

t = 2.5 seconds.

T = 5 + 2.5
= 7.5 seconds.