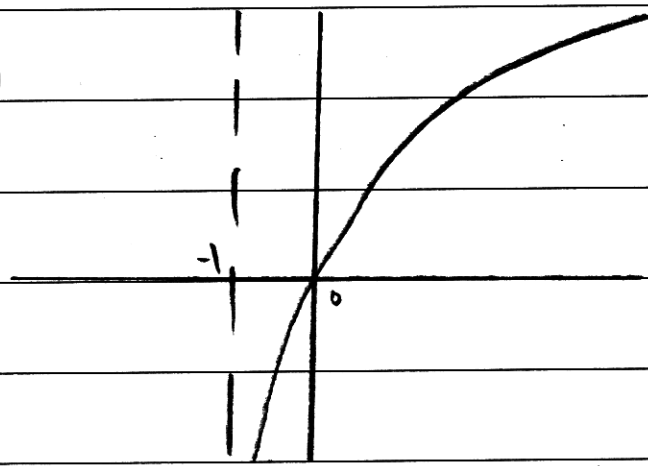
BOARD OF STUDIES
NEW SOUTH WALES

Q9. a) i)



ii) $\int_2^4 \ln(x-1)\,dx = \frac{h}{3}\left(f(2) + 4f\left(\frac{2+4}{2}\right) + f(4)\right)$

$= \frac{1}{3}(0 + 4\ln 2 + \ln 4)$

$= $ ~~1.386 units^2~~

$= 1.386$ units^2

b) $A_0 = 5000$

$A_1 = ~~15000~~ (A_0 \times 1.085) + 5000$

$A_2 = A_1 \times 1.085 + 5000$

$= ~~5000(2 + 1.085) \times 1.085 + 5000~~$

$= 5000(1 + 1.085) \times 1.085 + 5000$

$= 5000(1.085 + 1.085^2) + 5000$

$= 5000(1 + 1.085 + 1.085^2)$

$A_n = 5000(1 + 1.085 + 1.085^2 + \ldots 1.085^n)$

$A_{20} = 5000(1 + 1.085 + 1.085^2 + \ldots 1.085^{20})$

sum of geo prog.

where $a = 1$, $r = 1.085$, $n = 20$

$= \$\,18949.52$

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c) i) $y - y_1 = m(t - t_1)$

$y - 50 = 10(t - 5)$

$y = 10t$ ✓

ii) $\int y = x_1 = \int 10t$

$= 5t^2 + c_1$

~~at $y = 50$, $t = 5$~~ at $t = 0$

~~$50 = 125 + c$~~ $x_1 = 0$

$c = 0$

$x_2 = \int 2t^2$

$= \frac{2}{3}t^3 + c_2$

at $t = 0$

$x_2 = 0$

$c_2 = 0$

at $t = 5$

$x_1 = 125$.

$x_2 = 83\frac{1}{3}$

jet is $41\frac{2}{3}$ metres behind.

iii) $\frac{2}{3}t^3 - 5t^2 = 0$

$t^2(\frac{2}{3}t - 5) = 0$

$t = 0, 7\frac{1}{2}$

after $7\frac{1}{2}$ seconds they are same distance