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19/MHS01/360

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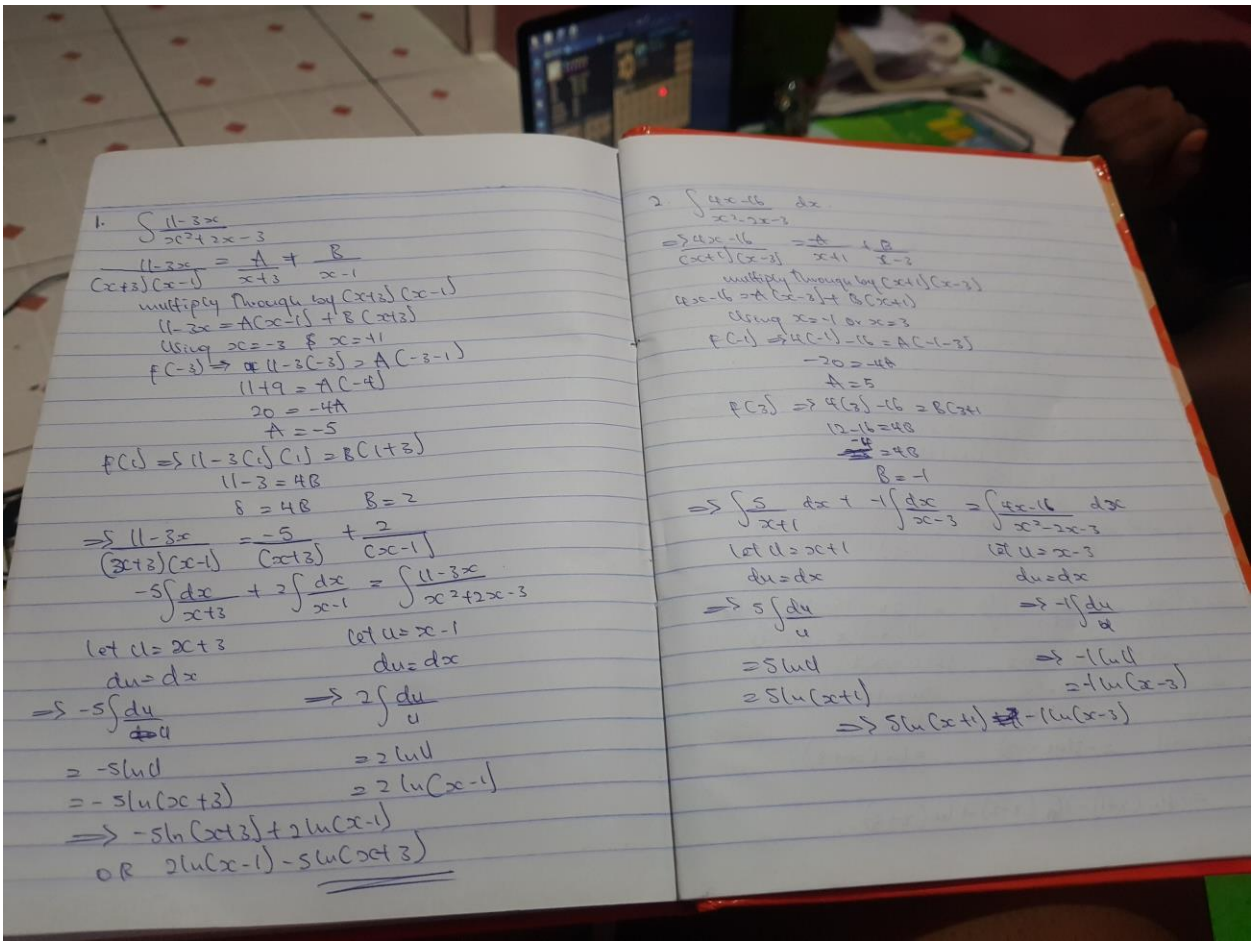
MATHS 104

MBBS



1. $\int \frac{11-3x}{x^2+2x-3}$

$\frac{11-3x}{(x+3)(x-1)} = \frac{A}{x+3} + \frac{B}{x-1}$

multiply through by $(x+3)(x-1)$

$11-3x = A(x-1) + B(x+3)$

Using $x=-3$ & $x=1$

$f(-3) \Rightarrow 11-3(-3) = A(-3-1)$

$11+9 = A(-4)$

$20 = -4A$

$A = -5$

$f(1) \Rightarrow 11-3(1) = B(1+3)$

$11-3 = 4B$

$8 = 4B \qquad B = 2$

$\Rightarrow \frac{11-3x}{(x+3)(x-1)} = \frac{-5}{(x+3)} + \frac{2}{(x-1)}$

$-5\int \frac{dx}{x+3} + 2\int \frac{dx}{x-1} = \int \frac{11-3x}{x^2+2x-3}$

let $u = x+3$ | let $u = x-1$

$du = dx$ | $du = dx$

$\Rightarrow -5\int \frac{du}{u}$ | $\Rightarrow 2\int \frac{du}{u}$

$= -5\ln u$ | $= 2\ln u$

$= -5\ln(x+3)$ | $= 2\ln(x-1)$

$\Rightarrow -5\ln(x+3) + 2\ln(x-1)$

OR $2\ln(x-1) - 5\ln(x+3)$

2. $\int \frac{4x-16}{x^2-2x-3} dx$

$\Rightarrow \frac{4x-16}{(x+1)(x-3)} = \frac{A}{x+1} + \frac{B}{x-3}$

multiply through by $(x+1)(x-3)$

$4x-16 = A(x-3) + B(x+1)$

Using $x=-1$ & $x=3$

$f(-1) \Rightarrow 4(-1) - 16 = A(-1-3)$

$-20 = -4A$

$A = 5$

$f(3) \Rightarrow 4(3) - 16 = B(3+1)$

$12-16 = 4B$

$-4 = 4B$

$B = -1$

$\Rightarrow \int \frac{5}{x+1} dx + -1\int \frac{dx}{x-3} = \int \frac{4x-16}{x^2-2x-3} dx$

let $u = x+1$ | let $u = x-3$

$du = dx$ | $du = dx$

$\Rightarrow 5\int \frac{du}{u}$ | $\Rightarrow -1\int \frac{du}{u}$

$= 5\ln u$ | $\Rightarrow -1\ln u$

$= 5\ln(x+1)$ | $= -1\ln(x-3)$

$\Rightarrow 5\ln(x+1) - 1\ln(x-3)$

3. $\int \frac{2x^2-9x-35}{(x+1)(x-2)(x+3)}$

$\Rightarrow \frac{2x^2-9x-35}{(x+1)(x-2)(x+3)} = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{x+3}$

multiply through by $(x+1)(x-2)(x+3)$

$2x^2-9x-35 = A(x+3)(x-2) + B(x+1)(x+3) + C(x+1)(x-2)$

Using $x=-1$ or $x=2$ or $x=-3$

$f(-1) \Rightarrow 2(-1)^2 - 9(-1) - 35 = A(-1+3)(-1-2)$

$2+9-35 = A(2)(-3)$

$-24 = -6A$

$A = 4$

$f(2) \Rightarrow 2(2)^2 - 9(2) - 35 = B(2+1)(2+3)$

$8-18-35 = B(3)(5)$

$-45 = 15B$

$B = -3$

$f(-3) \Rightarrow 2(-3)^2 - 9(-3) - 35 = C[-3+1](-3-2)$

$18+27-35 = C[-2](-5)$

$10 = 10C$

$\Rightarrow 4\int \frac{dx}{x+1} - 3\int \frac{dx}{x-2} + \int \frac{dx}{x+3} = \int \frac{2x^2-9x-35}{(x+1)(x-2)(x+3)}\,dx$

Let $u = x+1$ | Let $u = x-2$ | Let $u = x+3$

$du = dx$ | $du = dx$ | $du = dx$

$\Rightarrow 4\ln u$ | $\Rightarrow -3\ln u$ | $\Rightarrow \ln u$

$\Rightarrow 4\ln(x+1)$ | $= -3\ln(x-2)$ | $= \ln(x+3)$

$\Rightarrow 4\ln(x+1) - 3\ln(x-2) + \ln(x+3)$