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19/MHS01/304
MBBS
MTH 104

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

$\frac{11-3x}{x^2+2x+3} \quad \frac{-11-3x}{(x-1)(x+3} = \frac{A}{x-1)} + \frac{B}{(x+3)}$

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

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

At $x=-3$

$B(-4) = 11-3(-3) = 11+9$

$B = \frac{20}{-4} = -5$

At $x=1$, we have

$A(4) = 11-3$

$A(4) = 8$

$A = 2$

Therefore

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

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

2 $\int \frac{4x-16}{x^2-2x-3}\,\delta x$ $= \frac{4x-16}{(x+1)(x-3)}$

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

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

At $x = 3$

$B(4) = 12-16$

$B(4) = -4$

$B = -1$

At $x = -1$

$A(-4) = -4-16$

$A(-4) = -20$

$A = 5$

Therefore

$$\int \frac{5}{(x+1)}\,\delta x + \int \frac{-1}{(x-3)}\,\delta x = \int \frac{4x-16}{x^2-2x-3}\,\delta x$$

$= 5\ln|x+1| - \ln|x-3| + c$

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

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

$= 2x^2 - 9x - 35$

$Ax^2 + Ax - 6A + Bx^2 + 4Bx + 3B + Cx^2 + Cx + 2C = 2x^2 - 9x - 35$

$x^2(A+B+C) + x(A + 4B + C) - 6A + 3B + 2C = 2x^2 - 9x - 35$

$A + B + C = 2 \quad -(i)$

$A + 4B + C = -9 \quad -(ii)$

$-6A + 3B + 2C = -35 \quad -(iii)$

$A = 2 - B - C \quad -(iv)$

Substitute equ (iv) in eq(ii)

$2 - B - C + 4B + C = -9$

$-2C + 3B = -11 \quad -(v)$

Substitute equ (iv) into eq(iii)

$-6(2 - B - C) + 3B + 2C = -35$

$-12 + 6B + 6C + 3B + 2C = -35$

$9B + 4C = -23 \quad -(vi)$

$-2C + 3B = -11 \quad \times 3$

$4C + 9B = -23 \quad \times 1$

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$-6C + 9B = -33$

$-\ 4C + 9B = -23$

$-10C = -10$

$C = 1$

Using eq (v1)

$4C + 9B = -23$

$4(1) + 9B = -23$

$4 + 9B = -23$

$9B = -23 - 4$

$\frac{9B}{9} = \frac{-27}{9}$

$B = -3$

Using eq (w)

$A = 2 - B - C$

$A = 2 - (-3) - 1$

$A = 5 - 1$

$A = 4$

Therefore

$\frac{4}{(x+1)} + \frac{-3}{(x-2)} + \frac{1}{(x+3)}$

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

$\therefore 4\ln|x+1| - 3\ln|x-2| + \ln|x+3|$