NAME: VICTORY -OPUTA FIDENCE DAUDOO
DEPT.: MEDICINE AND SURGERY
MATRIC NO.: 19/MHS01/1433
COURSE CODE: MAT104

Assignment-

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

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

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

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

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

when $x=-3$

$11-3(-3) = B(-3-1)$

$11+9 = -4B$

$B = 20/-4$

$B = -5$ //

when $x=1$

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

$8 = 4A$

$A = 2$ //

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

$\therefore \int \frac{11-3x}{6x^2+2x-3}\,dx = 2\ln(x-1) - 5\ln(x+3) + C$ //

2. $\int \frac{4x-16}{x^2-2x-3}\,dx = \int \frac{4x-16}{(x-3)(x+1)}\,dx = \frac{A}{(x-3)} + \frac{B}{(x+1)}$

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

Multiply all by $(x-3)(x+1)$

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

$Ax+A+Bx-3B = 4x-16$

$x[A+B]+[A-3B] = 4x-16$

$A+B=4$ ——①

$A-3B=-16$ ——②

$4B=20$

$B=5$ ——③

But eqn ③ into ①

$A+5=4$

$A=4-5$

$A=-1$

$$\therefore \frac{-1}{(x-3)}dx + \frac{5}{(x+1)}dx = \int \frac{4x-16}{(x-3)(x+1)}dx$$

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

$du/dx = 1$ | $du/dx = 1$

$dx = du$ | $dx = du$

$$\therefore \frac{-1\,du}{u} + \frac{5\,du}{u}$$

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

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

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

$$= \frac{A[(x-2)(x+3)] + B[(x+1)(x+3)] + C[(x+1)(x-2)]}{(x+1)(x-2)(x+3)}$$

$$= \frac{A[x^2+3x-2x-6] + B[x^2+3x+x+3] + C[x^2-2x+x-2]}{(x+1)(x-2)(x+3)}$$

$$= \frac{Ax^2+3Ax-2Ax-6A+Bx^2+3Bx+Bx+3B+Cx^2-Cx-2C}{(x+1)(x-2)(x+3)}$$

$$= \frac{Ax^2+Ax-6A+Bx^2+4Bx+3B+Cx^2-Cx-2C}{(x+1)(x-2)(x+3)}$$

$$= \frac{x^2(A+B+C)+x(A+4B-C)+(-6A+3B-2C)}{(x+1)(x-2)(x+3)}$$

$\Rightarrow A+B+C=2$ ——①

$A+4B-C=-9$ ——②

$-6A+3B-2C=-35$ ——③

$A=2-B-C$ ——④

Put eqn ④ in ② and ③

② $2-B-C+4B-C=-9$

$2+3B-2C=-9$

$3B-2C=-9-2$

$3B-2C=-11$ ——⑤

③ $-6[2-B-C]+3B-2C=-35$

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

$9B+4C=-23$ ——⑥

Solve eqn ⑤ and ⑥ simultaneously:

$4\times\ 3B-2C=-11$

$2\times\ 9B+4C=-23$

$\Rightarrow 12B-8C=-44$

$+\ 18B+8C=-46$

$30B=-90$

$B=-3$ ——⑦

But ⑦ in ⑤

$3(-3)-2C=-11$

$-9-2C=-11$

$-2C=-11+9 \Rightarrow -2C=-2 \therefore C=1$ ——⑧

Put (5) in (4)

$A = 2 - B - C$

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

$A = 2 + 3 - 1$

$A = 4$

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

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

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