Name: [illegible]

Matric Number: 19/MHS01/018

College/Dept: MHS/MBBS

Course: MAT 104

19/MHS01/018

Number 1

1] $\dfrac{11-3x}{x^2+2x-3}$

$\Rightarrow \int \dfrac{11-3x}{x^2+2x-3}\,dx$

From the denominator

$x^2+2x-3=0$

$x^2+3x-x-3=0$

$x(x+3)-1(x+3)=0$

$(x-1)(x+3)=0$

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

Resolving $\dfrac{11-3x}{(x-1)(x+3)}$ into partial fraction

$\dfrac{11-3x}{(x+3)(x-1)} \equiv \dfrac{A}{(x+3)} + \dfrac{B}{(x-1)}$

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

Equating the numerator

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

Put $x=1$

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

$8 = 4B$

$B = 2$

Put $x=-3$

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

$20 = -4A$

$A = -5$

$\therefore \dfrac{11-3x}{(x+3)(x-1)} = \dfrac{-5}{(x+3)} + \dfrac{2}{(x-1)}$

$\int \left\{\dfrac{11-3x}{(x+3)(x-1)}\right\} dx = \int \left\{\dfrac{-5}{(x+3)} + \dfrac{2}{(x-1)}\right\} dx$

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

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

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

Number 2

[2] $\int \dfrac{4x-16}{x^2-2x-3}$

From the denominator

$x^2-2x-3=0$

$x^2-3x+x-3=0$

$x(x-3)+1(x-3)=0$

$(x-3)(x+1)=0$

$\therefore \int \dfrac{4x-16}{x^2-2x-3} = \int \dfrac{4x-16}{(x-3)(x+1)}$

Resolving $\dfrac{4x-16}{(x-3)(x+1)}$ into partial fraction

$\dfrac{4x-16}{(x-3)(x+1)} \equiv \dfrac{A}{(x-3)} + \dfrac{B}{(x+1)}$

$\dfrac{4x-16}{(x-3)(x+1)} \equiv \dfrac{A(x+1)+B(x-3)}{(x-3)(x+1)}$

Equating the numerator

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

Put $x=3$

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$4(-1) - 12 = 16$ and

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

$-20 = -4B$

$B = 5$

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

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

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

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

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

Number 3

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

Resolving into partial fraction

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

Equating the numerator

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

Put $x = 2$

$-45 = 15B$

$B = -3$

Put $x = -1$

$-24 = -6A$

$A = 4$

Put $x = -3$

Number 3

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$10 = 10c$

$c = 1$

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

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

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

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

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

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