MAT 104 (ASSIGNMENT)

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

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

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

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

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

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

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

$\frac{8}{4} \Rightarrow \frac{4A}{4}$, $A \Rightarrow 2$

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

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

$\therefore \int \frac{11-3x}{x^2+2x-3}\,dx \Rightarrow 2\ln(x-1) - 5\ln(x+3) + k$

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

$\frac{4x-16}{x^2-2x-3} \Rightarrow \frac{4x-16}{(x-3)(x+1)} \Rightarrow \frac{A}{(x-3)} + \frac{B}{(x+1)}$

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

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

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

$\frac{-20}{-4} \Rightarrow \frac{-4B}{-4}$, $B \Rightarrow 5$

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

$\frac{-4}{4} \Rightarrow \frac{4A}{4}$, $A \Rightarrow -1$

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

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

$\therefore \int \frac{4x-16}{x^2-2x-3}dx \Rightarrow -\ln(x-3) + 5\ln(x+1) + K$

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

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

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

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

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

$\frac{+24}{+6} = \frac{-6A}{-6}$, $A \Rightarrow 4$

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

$\frac{-45}{15} = \frac{15B}{15}$, $B \Rightarrow -3$

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

$\frac{10}{10} = \frac{10C}{10}$, $C \Rightarrow 1$

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

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

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