



Indefinite Integrals Ex 19.30 Q1

$$\text{Let } \int \frac{2x+1}{(x+1)(x-2)} = \frac{A}{(x+1)} + \frac{B}{(x-2)}$$

$$\Rightarrow 2x+1 = A(x-2) + B(x+1)$$

Put  $x = 2$

$$\Rightarrow 5 = 3B \Rightarrow B = \frac{5}{3}$$

Put  $x = -1$

$$\Rightarrow -1 = -3A \Rightarrow A = \frac{1}{3}$$

So,

$$\begin{aligned} \int \frac{2x+1}{(x+1)(x-2)} dx &= \frac{1}{3} \int \frac{dx}{x+1} + \frac{5}{3} \int \frac{dx}{x-2} \\ &= \frac{1}{3} \log|x+1| + \frac{5}{3} \log|x-2| + c \end{aligned}$$

Thus,

$$I = \frac{1}{3} \log|x+1| + \frac{5}{3} \log|x-2| + c$$

Indefinite Integrals Ex 19.30 Q2

$$\text{Let } \int \frac{1}{x(x-2)(x-4)} dx = \frac{A}{x} + \frac{B}{x-2} + \frac{C}{x-4}$$

$$\Rightarrow 1 = A(x-2)(x-4) + B(x)(x-4) + Cx(x-2)$$

Put  $x = 0$

$$\Rightarrow 1 = 8A \Rightarrow A = \frac{1}{8}$$

Put  $x = 2$

$$\Rightarrow 1 = -4B \Rightarrow B = -\frac{1}{4}$$

Put  $x = 4$

$$\Rightarrow 1 = 8C \Rightarrow C = \frac{1}{8}$$

So,

$$\begin{aligned} \int \frac{1}{x(x-2)(x-4)} dx &= \frac{1}{8} \int \frac{dx}{x} + \left(-\frac{1}{4}\right) \int \frac{dx}{x-2} + \frac{1}{8} \int \frac{dx}{x-4} \\ &= \frac{1}{8} \log|x| - \frac{1}{4} \log|x-2| + \frac{1}{8} \log|x-4| + c \\ &= \frac{1}{8} \log \left| \frac{x(x-4)}{(x-2)^2} \right| + c \end{aligned}$$

Thus,

$$I = \frac{1}{8} \log \left| \frac{x(x-4)}{(x-2)^2} \right| + c$$

Indefinite Integrals Ex 19.30 Q3

$$\text{Let } I = \int \frac{x^2 + x - 1}{x^2 + x - 6} dx$$

$$= \int 1 + \frac{5}{x^2 + x - 6} dx$$

$$\Rightarrow I = \int dx + \int \frac{5dx}{(x+3)(x-2)} \quad \dots (1)$$

$$\text{Let } \frac{5}{(x+3)(x-2)} = \frac{A}{x+3} + \frac{B}{x-2}$$

$$\Rightarrow 5 = A(x-2) + B(x+3)$$

$$\text{Put } x = 2$$

$$\Rightarrow 5 = 5B \Rightarrow B = 1$$

$$\text{Put } x = -3$$

$$\Rightarrow 5 = -5A \Rightarrow A = -1$$

$$\begin{aligned} \therefore I &= \int dx + \int \frac{-dx}{x+3} + \int \frac{dx}{x-2} \\ &= x - \log|x+3| + \log|x-2| + c \end{aligned}$$

Hence,

$$I = x - \log|x+3| + \log|x-2| + c$$

Indefinite Integrals Ex 19.30 Q4

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

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

$$\Rightarrow I = -\int dx + \int \frac{5x+1}{(x+2)(x-1)} dx \quad \dots (1)$$

$$\text{Let } \frac{5x+1}{(x+2)(x-1)} = \frac{A}{x+2} + \frac{B}{x-1}$$

$$\Rightarrow 5x+1 = A(x-1) + B(x+2)$$

$$\text{Put } x = 1$$

$$\Rightarrow 6 = 3B \Rightarrow B = 2$$

$$\text{Put } x = -2$$

$$\Rightarrow -9 = -3A \Rightarrow A = 3$$

So,

$$I = -\int dx + 3\int \frac{dx}{x+2} + 2\int \frac{dx}{x-1}$$

$$I = -x + 3\log|x+2| + 2\log|x-1| + c$$

Indefinite Integrals Ex 19.30 Q5

$$\text{Let } I = \int \frac{x^2+1}{x^2-1} dx$$

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

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

$$= \int dx + \int \frac{-1}{x+1} + \frac{1}{x-1} dx$$

$$= x - \log|x+1| + \log|x-1| + c$$

$$I = x + \log \left| \frac{x-1}{x+1} \right| + c$$

\*\*\*\*\* END \*\*\*\*\*

