



Indefinite Integrals Ex 19.30 Q32

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

$$\begin{aligned}\Rightarrow x^2 + x - 1 &= A(x+1)(x+2) + B(x+2) + C(x+1)^2 \\ &= (A+C)x^2 + (3A+B+2C)x + (2A+2B+C)\end{aligned}$$

Equating similar terms

$$A + C = 1, 3A + B + 2C = 1, 2A + 2B + C = -1$$

Solving, we get, $A = 0, B = -1, C = 1$

Thus,

$$\begin{aligned}I &= 0 \int \frac{dx}{x+1} + (-1) \int \frac{dx}{(x+1)^2} + 1 \int \frac{dx}{(x+2)} \\ &= +\frac{1}{x+1} + \log|x+2| + c\end{aligned}$$

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

Indefinite Integrals Ex 19.30 Q33

$$\text{Let } \frac{2x^2 + 7x - 3}{x^2(2x+1)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{(2x+1)}$$

$$\Rightarrow 2x^2 + 7x - 3 = Ax(2x+1) + B(2x+1) + Cx^2$$

Equating similar terms, we get,

$$2A + C = 2, A + 2B = 7, B = -3$$

Solving, we get, $A = 13, C = -24$

Thus,

$$I = \int \frac{13dx}{x} - \int \frac{3dx}{x^2} - 24 \int \frac{dx}{2x+1}$$

$$I = 13 \log|x| + \frac{3}{x} - 12 \log|2x+1| + c$$

Indefinite Integrals Ex 19.30 Q34

$$\text{Let } I = \int \frac{5x^2 + 20x + 6}{x^3 + 2x^2 + x} dx$$

$$= \int \frac{5x^2 + 20x + 6}{x(x+1)^2} dx$$

Now,

$$\text{Let } \frac{5x^2 + 20x + 6}{x(x+1)^2} = \frac{A}{x} + \frac{B}{x+1} + \frac{C}{(x+1)^2}$$

$$\Rightarrow 5x^2 + 20x + 6 = A(x+1)^2 + Bx(x+1) + Cx$$

Equating similar terms, we get,

$$A + B = 5, 2A + B + C = 20, A = 6$$

Solving, we get, $B = -1, C = 9$

Thus,

$$I = \int \frac{6dx}{x} - 1 \int \frac{dx}{x+1} + 9 \int \frac{dx}{(x+1)^2}$$

$$\therefore I = 6 \log|x| - \log|x+1| - \frac{9}{x+1} + c$$

Indefinite Integrals Ex 19.30 Q35

$$\text{Let } \frac{18}{(x+2)(x^2+4)} = \frac{A}{x+2} + \frac{Bx+C}{x^2+4}$$

$$\Rightarrow 18 = A(x^2+4) + (Bx+C)(x+2)$$

$$18 = (A+B)x^2 + (2B+C)x + (4A+2C)$$

Equating similar terms, we get,

$$A + B = 0, 2B + C = 0, 4A + 2C = 18$$

Solving, we get, $A = \frac{9}{4}, B = -\frac{9}{4}, C = \frac{9}{2}$

Thus,

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

$$I = \frac{9}{4} \log|x+2| - \frac{9}{8} \log|x^2+4| + \frac{9}{4} \tan^{-1}\left(\frac{x}{2}\right) + c \quad \left[\because \int \frac{dx}{x^2+a^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} \right]$$

Indefinite Integrals Ex 19.30 Q36

$$\text{Let } \frac{5}{(x^2+1)(x+2)} = \frac{Ax+B}{x^2+1} + \frac{C}{x+2}$$

$$\Rightarrow 5 = (Ax+B)(x+2) + C(x^2+1)$$

Equating similar terms, we get,

$$A + C = 0, 2A + B = 0, 2B + C = 5$$

Solving, we get, $A = -1, B = 2, C = 1$

Thus,

$$\begin{aligned} I &= \int \frac{-x+2}{x^2+1} dx + \int \frac{dx}{x+2} \\ &= \int \frac{-x dx}{x^2+1} + 2 \int \frac{dx}{x^2+1} + \int \frac{dx}{x+2} \end{aligned}$$

$$I = -\frac{1}{2} \log|x^2+1| + 2 \tan^{-1} x + \log|x+2| + c$$

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