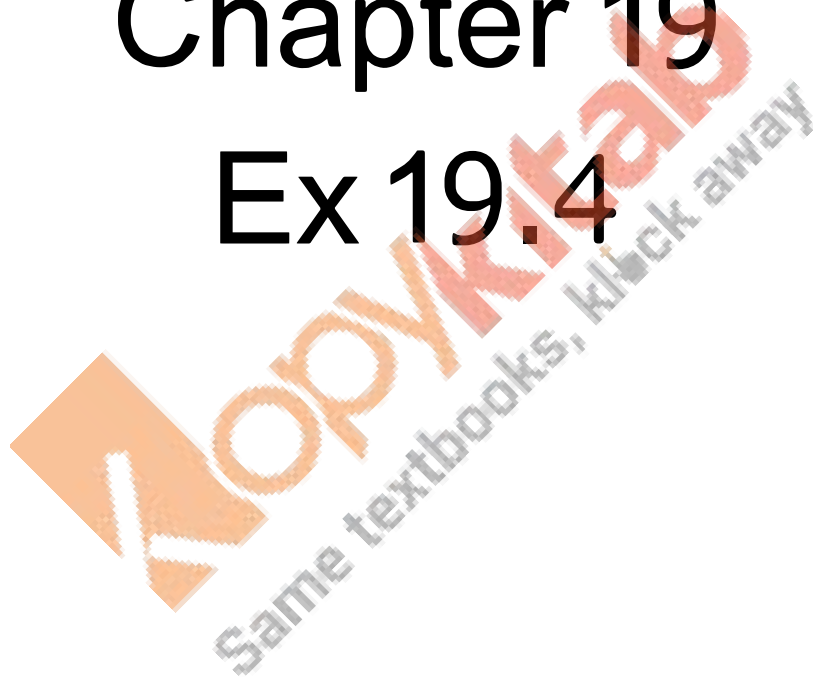


RD Sharma  
Solutions  
Class 12 Maths  
Chapter 19  
Ex 19.4



### Indefinite Integrals Ex 19.4 Q1

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

Using long division method, we have

$$\frac{x^2 + 5x + 2}{x + 2} = x + 3 - \frac{4}{x + 2}$$

$$\therefore I = \int \frac{x^2 + 5x + 2}{x + 2} = \int \left( x + 3 - \frac{4}{x + 2} \right) dx$$

$$\begin{aligned} \Rightarrow I &= \int x dx + 3 \int dx - 4 \int \frac{1}{x + 2} dx \\ &= \frac{x^2}{2} + 3x - 4 \log|x + 2| + c \end{aligned}$$

$$\therefore I = \frac{x^2}{2} + 3x - 4 \log|x + 2| + c$$

### Indefinite Integrals Ex 19.4 Q2

$$\text{Let } I = \int \frac{x^3}{x - 2} dx$$

Using long division method, we have

$$\frac{x^3}{x - 2} = x^2 + 2x + 4 + \frac{8}{x - 2}$$

$$\begin{aligned} \therefore I &= \int \left( x^2 + 2x + 4 + \frac{8}{x - 2} \right) dx \\ &= \int x^2 dx + 2 \int x dx + 4 \int dx + 8 \int \frac{1}{x - 2} dx \\ &= \frac{x^3}{3} + \frac{2x^2}{2} + 4x + 8 \log|x - 2| + c \\ &= \frac{x^3}{3} + x^2 + 4x + 8 \log|x - 2| + c \end{aligned}$$

$$\therefore I = \frac{x^3}{3} + x^2 + 4x + 8 \log|x - 2| + c$$

### Indefinite Integrals Ex 19.4 Q3

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

Using long division method, we have

$$\frac{x^2 + x + 5}{3x + 2} = \frac{x}{3} + \frac{1}{9} + \frac{43}{9} \times \frac{1}{3x + 2}$$

$$\begin{aligned} \therefore I &= \int \left( \frac{x}{3} + \frac{1}{9} + \frac{43}{9} \times \frac{1}{3x + 2} \right) dx \\ &= \frac{x^2}{6} + \frac{1}{9} \times x + \frac{43}{9 \times 3} |3x + 2| + c \\ &= \frac{x^2}{6} + \frac{1}{9} \times x + \frac{43}{27} \times \log|3x + 2| + c \end{aligned}$$

$$\therefore I = \frac{x^2}{6} + \frac{1}{9} \times x + \frac{43}{27} \times \log|3x + 2| + c$$

#### Indefinite Integrals Ex 19.4 Q4

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

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

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

#### Indefinite Integrals Ex 19.4 Q5

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

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

$$\therefore I = x + \log|x + 1| + \frac{3}{x + 1} + c$$

### Indefinite Integrals Ex 19.4 Q6

Let  $I = \int \frac{2x - 1}{(x - 1)^2} dx$ . Then,

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

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