



Definite Integrals Ex 20.3 Q1(i)

We have,

$$\begin{aligned}& \int_1^4 f(x) dx \\&= \int_1^2 (4x + 3) dx + \int_2^4 (3x + 5) dx \\&= \left[\frac{4x^2}{2} + 3x \right]_1^2 + \left[\frac{3x^2}{2} + 5x \right]_2^4 \\&= \left[\left(\frac{16}{2} + 6 \right) - \left(\frac{4}{2} + 3 \right) \right] + \left[\left(\frac{48}{2} + 20 \right) - \left(\frac{12}{2} + 10 \right) \right] \\&= [14 - 5] + [44 - 16] \\&= 9 + 28 \\&= 37\end{aligned}$$

Definite Integrals Ex 20.3 Q1(ii)

We have,

$$\int_0^9 f(x) dx$$

$$= \int_0^{\frac{\pi}{2}} \sin x dx + \int_{\frac{\pi}{2}}^3 1 dx + \int_3^9 e^{x-3} dx$$

$$= \left[-\cos x \right]_0^{\frac{\pi}{2}} + \left[x \right]_{\frac{\pi}{2}}^3 + \left[e^{x-3} \right]_3^9$$

$$= \left[-\cos \frac{\pi}{2} + \cos 0 \right] + \left[3 - \frac{\pi}{2} \right] + \left[e^{9-3} - e^{3-3} \right]$$

$$= [0 + 1] + \left[3 - \frac{\pi}{2} \right] + [e^6 - e^0]$$

$$= 0 + 1 + 3 - \frac{\pi}{2} + e^6 - e^0$$

$$= 1 + 3 - \frac{\pi}{2} + e^6 - 1$$

$$= 3 - \frac{\pi}{2} + e^6$$

Definite Integrals Ex 20.3 Q1(iii)

We have,

$$\begin{aligned} & \int_1^4 f(x) dx \\ &= \int_1^3 (7x + 3) dx + \int_3^4 8x dx \\ &= \left[\frac{7x^2}{2} + 3x \right]_1^3 + \left[\frac{8x^2}{2} \right]_3^4 \\ &= \left[\left(\frac{7 \times 9}{2} + 3 \times 3 \right) - \left(\frac{7 \times 1}{2} + 3 \times 1 \right) \right] + \left[\left(\frac{8 \times 16}{2} - \frac{8 \times 9}{2} \right) \right] \\ &= \left[\frac{63}{2} + 9 - \frac{7}{2} - 3 \right] + [64 - 36] \\ &= 34 + 28 \\ &= 62 \end{aligned}$$

Definite Integrals Ex 20.3 Q2

We have,

$$\begin{aligned} & \int_{-4}^4 |x + 2| dx \\ &= \int_{-4}^{-2} -(x + 2) dx + \int_{-2}^4 (x + 2) dx \\ &= - \left[\frac{x^2}{2} + 2x \right]_{-4}^{-2} + \left[\frac{x^2}{2} + 2x \right]_{-2}^4 \\ &= - \left[\left(\frac{4}{2} - 4 \right) - \left(\frac{16}{2} - 8 \right) \right] + \left[\left(\frac{16}{2} + 8 \right) - \left(\frac{4}{2} - 4 \right) \right] \\ &= - [(-2) - (0)] + [(16) - (-2)] \\ &= -[-2] + [16 + 2] \\ &= 2 + 18 \\ &= 20 \end{aligned}$$

$$\therefore \int_{-4}^4 |x + 2| dx = 20$$

***** END *****

