Definite Integrals Ex 20.3 Q1(i)

We have,

$$\int_1^4 f(x)\,dx$$

$$= \int_1^2 (4x+3)\,dx + \int_2^4 (3x+5)\,dx$$

$$= \left[\frac{4x^2}{2}+3x\right]_1^2 + \left[\frac{3x^2}{2}+5x\right]_2^4$$

$$= \left[\left(\frac{16}{2}+6\right)-\left(\frac{4}{2}+3\right)\right]+\left[\left(\frac{48}{2}+20\right)-\left(\frac{12}{2}+10\right)\right]$$

$$= \left[(14-5)\right]+\left[(44-16)\right]$$

$$= 9+28$$

$$= 37$$

Definite Integrals Ex 20.3 Q1(ii)

We have,

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

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

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

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

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

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

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

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

Definite Integrals Ex 20.3 Q1(iii)

We have,

$$\int_1^4 f(x)\,dx$$

$$= \int_1^3 (7x+3)\,dx + \int_3^4 8x\,dx$$

$$= \left[\frac{7x^2}{2}+3x\right]_1^3 + \left[\frac{8x^2}{2}\right]_3^4$$

$$= \left[\left(\frac{7\times 9}{2}+3\times 3\right)-\left(\frac{7\times 1}{2}+3\times 1\right)\right]+\left[\left(\frac{8\times 16}{2}-\frac{8\times 9}{2}\right)\right]$$

$$= \left[\frac{63}{2}+9-\frac{7}{2}-3\right]+[64-36]$$

$$= 34+28$$

$$= 62$$

Definite Integrals Ex 20.3 Q2

We have,

$$\int_{-4}^4 |x+2|\,dx$$

$$= \int_{-4}^{-2} -(x+2)\,dx + \int_{-2}^4 (x+2)\,dx$$

$$= -\left[\frac{x^2}{2}+2x\right]_{-4}^{-2} + \left[\frac{x^2}{2}+2x\right]_{-2}^4$$

$$= -\left[\left(\frac{4}{2}-4\right)-\left(\frac{16}{2}-8\right)\right]+\left[\left(\frac{16}{2}+8\right)-\left(\frac{4}{2}-4\right)\right]$$

$$= -[(-2)-(0)]+[(16)-(-2)]$$

$$= -[-2]+[16+2]$$

$$= 2-18$$

$$= 20$$

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

********** END **********