



Definite Integrals Ex 20.3 Q11

$$\begin{aligned}& \int_0^{\frac{\pi}{2}} |\cos 2x| dx \\&= \int_0^{\frac{\pi}{4}} -\cos 2x \, dx + \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} +\cos 2x \, dx \\&= \left[\frac{+\sin 2x}{2} \right]_0^{\frac{\pi}{4}} + \left[\frac{-\sin 2x}{2} \right]_{\frac{\pi}{4}}^{\frac{\pi}{2}} \\&= \frac{1}{2} \left[\sin \frac{\pi}{2} - \sin 0 \right] + \frac{1}{2} \left[\sin \pi + \sin \frac{\pi}{2} \right] \\&= \frac{1}{2} [1] + \frac{1}{2} [1] \\&= \frac{1}{2} + \frac{1}{2} \\&= 1\end{aligned}$$

$$\therefore \int_0^{\frac{\pi}{2}} |\cos 2x| dx = 1$$

Definite Integrals Ex 20.3 Q12

$$\begin{aligned}\int_0^{2\pi} |\sin x| dx &= \int_0^{\pi} \sin x \, dx + \int_{\pi}^{2\pi} -\sin x \, dx \\&= \left[-\cos x \right]_0^{\pi} + \left[\cos x \right]_{\pi}^{2\pi} \\&= [1+1] + [1+1]\end{aligned}$$

$$\int_0^{2\pi} |\sin x| dx = 4$$

Definite Integrals Ex 20.3 Q13

$$\begin{aligned}
& \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} |\sin x| dx \\
&= \int_{-\frac{\pi}{4}}^0 -\sin x \, dx + \int_0^{\frac{\pi}{4}} \sin x \, dx \\
&= [\cos x]_{-\frac{\pi}{4}}^0 + [-\cos x]_0^{\frac{\pi}{4}} \\
&= \left(1 - \frac{1}{\sqrt{2}}\right) - \left(\frac{1}{\sqrt{2}} - 1\right) \\
&= (2 - \sqrt{2})
\end{aligned}$$

$$\therefore \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} |\sin x| dx = 2 - \sqrt{2}$$

Definite Integrals Ex 20.3 Q14

We have,

$$I = \int_2^8 |x - 5| dx$$

We have,

$$|x - 5| = \begin{cases} x - 5 & \text{if } x \in (5, 8) \\ -(x - 5) & \text{if } x \in (2, 5) \end{cases}$$

Hence,

$$\begin{aligned}
I &= \int_2^5 -(x - 5) dx + \int_5^8 (x - 5) dx \\
&= -\left[\frac{x^2}{2} - 5x\right]_2^5 + \left[\frac{x^2}{2} - 5x\right]_5^8 \\
&= -\left[\left(\frac{25}{2} - 25\right) - \left(\frac{4}{2} - 10\right)\right] + \left[\left(\frac{64}{2} - 40\right) - \left(\frac{25}{2} - 25\right)\right] \\
&= -\left[-\frac{25}{2} + 8\right] + \left[(-8) + \left(\frac{25}{2}\right)\right] \\
&= \frac{25}{2} - 8 - 8 + \frac{25}{2} \\
&= 25 - 16 = 9
\end{aligned}$$

$$\therefore \int_2^8 |x - 5| dx = 9$$

***** END *****