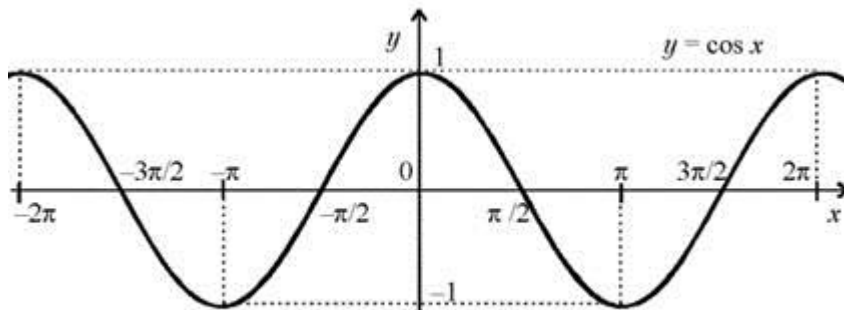Question #51707, Math, Integral Calculus

$$\int_{-2\pi}^{\pi} \cos|x| \, dx$$

Solution

$$|x| = \begin{cases} -x, x < 0 \\ x, x \geq 0 \end{cases} ;$$

$$\cos(-x) = \cos x.$$

Therefore

$$\int_{-2\pi}^{\pi} \cos|x| \, dx = \int_{-2\pi}^{0} \cos|x| \, dx + \int_{0}^{\pi} \cos|x| \, dx = \int_{-2\pi}^{0} \cos(-x) \, dx + \int_{0}^{\pi} \cos x \, dx = \int_{-2\pi}^{0} \cos x \, dx + \int_{0}^{\pi} \cos x \, dx =$$

$$= \int_{-2\pi}^{\pi} \cos x \, dx = \sin x \Big|_{-2\pi}^{\pi} = \sin \pi - \sin(-2\pi) = 0.$$

Answer: 0.