

$$\int x \sin^2 x \, dx$$

Solution:

$$\begin{aligned} \int x \sin^2 x \, dx &= \int x \cdot \frac{(1 - \cos 2x)}{2} \, dx \\ &= \frac{1}{2} \left[\int x \, dx - \int x \cdot \cos 2x \, dx \right] \\ &= \frac{x^2}{4} - \frac{x}{4} \sin 2x - \frac{1}{8} \cos 2x + c. \end{aligned}$$