

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

Solution:

$$\begin{aligned} I &= \int x^2 \sin 2x \, dx = \frac{-x^2 \cos 2x}{2} + \int \frac{2x \cos 2x}{2} \, dx + c \\ &= -\frac{x^2 \cos 2x}{2} + \frac{x \sin 2x}{2} + \frac{\cos 2x}{4} + c. \end{aligned}$$