

$$\int \sin^3 x \, dx$$

$$\begin{aligned} \int \sin^3 x \, dx &= \int \sin^2 x \cdot \sin x \, dx = -\int \sin^2 x \, d\cos x = \\ &= -\int (1 - \cos^2 x) \, d\cos x = \int [t = \cos x] = \int (t^2 - 1) \, dt = \frac{t^3}{3} - t = \\ &= \left[\cos x = t \right] = \frac{\cos^3 x}{3} - \cos x + C \end{aligned}$$

$$d(-\cos x) = \sin x \, dx$$