

Quiz 6, September 1, 2016

Find $\int \sin^3 x dx$.

Answer: Save $\sin x dx$ and convert the remaining $\sin^2 x$ into cosines by using

$$\sin^2 x + \cos^2 x = 1.$$

Then let $u = \cos x$. It follows that $du = -\sin x dx$. We have

$$\begin{aligned} \int \sin^3 x dx &= \int (1 - \cos^2 x) \sin x dx = -\int (1 - u^2) du = -(u - u^3/3) + C \\ &= \boxed{-(\cos x - \cos^3 x/3) + C} \end{aligned}$$

Check. The derivative of the proposed answer is

$$-(-\sin x - \cos^2 x(-\sin x)) = \sin x(1 - \cos^2 x) = \sin^3 x. \checkmark$$