

PRINT Your Name: _____

Quiz 4 — February 3, 2012 – Section 8 – 10:10 – 11:00

Remove everything from your desk except this page and a pencil or pen.

Circle your answer. **Show your work. Check your answer.**

The quiz is worth 5 points.

Find $\int x \sin^2 x dx$.

Answer: Use integration by parts with $u = x$ and $dv = \sin^2 x dx$. We compute $du = dx$ and $v = \int \sin^2 x dx = \frac{1}{2} \int (1 - \cos 2x) dx = \frac{1}{2} (x - \frac{\sin(2x)}{2})$. The original integral is

$$\begin{aligned} x \left(\frac{x}{2} - \frac{\sin(2x)}{4} \right) - \int \left(\frac{x}{2} - \frac{\sin(2x)}{4} \right) dx &= x \left(\frac{x}{2} - \frac{\sin(2x)}{4} \right) - \left(\frac{x^2}{4} + \frac{\cos(2x)}{8} \right) + C \\ &= \boxed{\frac{x^2}{4} - \frac{x \sin(2x)}{4} - \frac{\cos(2x)}{8} + C} \end{aligned}$$

Check. The derivative of the proposed answer is

$$\frac{x}{2} - \frac{2x \cos(2x) + \sin(2x)}{4} - \frac{-\sin(2x)}{4} = \frac{x}{2} (1 - \cos(2x)) = x \sin^2 x. \checkmark$$