

PRINT Your Name: _____

Quiz 2 — September 1, 2010 – Section 9 – 10:10 – 11:00

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

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

The quiz is worth 5 points.

Find $\int \sec^6 t dt$.

Answer: Save $\sec^2 t$. Convert the remaining $\sec^4 t$ to $\tan t$'s using $\tan^2 t + 1 = \sec^2 t$. Let $u = \tan t$. It follows that $du = \sec^2 t dt$. The original problem is equal to

$$\begin{aligned} \int (\tan^2 t + 1)^2 \sec^2 t dt &= \int (u^2 + 1)^2 du = \int (u^4 + 2u^2 + 1) du = \frac{u^5}{5} + \frac{2u^3}{3} + u + C \\ &= \boxed{\frac{\tan^5 t}{5} + \frac{2 \tan^3 t}{3} + \tan t + C}. \end{aligned}$$

Check. The derivative of the proposed answer is

$$\begin{aligned} \tan^4 t \sec^2 t + 2 \tan^2 t \sec^2 t + \sec^2 t &= \sec^2 t (\tan^4 + 2 \tan^2 t + 1) = \sec^2 t (\tan^2 t + 1)^2 \\ &= \sec^2 t \sec^4 t. \checkmark \end{aligned}$$