

Quiz #7

SOLUTION

1. { 12 points } Evaluate the integral

$$\int \sin^2(2x) \cos^3(2x) dx$$

$$\int \sin^2(2x) \cos^3(2x) dx = \int \sin^2(2x) \cos^2(2x) \cos(2x) dx := I$$

change of variables: $u = \sin(2x) \Rightarrow du = 2 \cos(2x) dx$

Using the formula $\sin^2(2x) + \cos^2(2x) = 1$ **we receive** $\cos^2(2x) = 1 - u^2$

$$\begin{aligned} I &= \frac{1}{2} \int u^2 (1 - u^2) du = \frac{1}{2} \int u^2 - u^4 du = \frac{1}{2} \left(\frac{u^3}{3} - \frac{u^5}{5} \right) + C \\ &= \frac{\sin^3(2x)}{6} - \frac{\sin^5(2x)}{10} + C \end{aligned}$$