

SHOW ALL WORK!!! Unsupported answers might not receive full credit.

**Problem 1** [6 points] Evaluate the integral.

$$\begin{aligned} & \int \sin^8(5\theta) \cos^3(5\theta) d\theta \\ &= \int \sin^8(5\theta) \cos^2(5\theta) \cos(5\theta) d\theta \\ &= \int \sin^8(5\theta) (1 - \sin^2(5\theta)) \cos(5\theta) d\theta \end{aligned}$$

$$(u = \sin(5\theta), \quad du = 5 \cos(5\theta) d\theta, \quad \cos(5\theta) d\theta = \frac{1}{5} du)$$

$$\begin{aligned} &= \frac{1}{5} \int u^8 (1 - u^2) du \\ &= \frac{1}{5} \int u^8 - u^{10} du \\ &= \frac{1}{5} \left( \frac{u^9}{9} - \frac{u^{11}}{11} \right) + C \\ &= \frac{u^9}{45} - \frac{u^{11}}{55} + C \\ &= \frac{\sin^9(5\theta)}{45} - \frac{\sin^{11}(5\theta)}{55} + C \end{aligned}$$