

Math 226 Sections 29 and 33 Quiz 3 (make up)

Name: \_\_\_\_\_

Evaluate each integral.

$$1. \int_0^{\pi/2} \sin^5(t) \cos^2(t) dt = \int_0^{\pi/2} (\sin^2 t)^2 \cos^2 t \sin t dt$$

$$= \int_0^{\pi/2} (1 - \cos^2 t)^2 \cos^2 t \sin t dt = - \int_1^0 (1 - u^2)^2 u^2 du$$

$$\left[ \begin{array}{l} u = \cos t \\ du = -\sin t dt \end{array} \right] = \int_0^1 u^2 - 2u^4 + u^6 du = \left( \frac{u^3}{3} - \frac{2u^5}{5} + \frac{u^7}{7} \right) \Big|_0^1$$

$$= \boxed{\frac{1}{3} - \frac{2}{5} + \frac{1}{7}}$$

$$2. \int \sec^4(\theta) \tan^2(\theta) d\theta$$

$$= \int \sec^2 \theta \tan^2 \theta \sec^2 \theta d\theta = \int (1 + \tan^2 \theta) \tan^2 \theta \sec^2 \theta d\theta$$

$$\left[ \begin{array}{l} u = \tan \theta \\ du = \sec^2 \theta d\theta \end{array} \right] = \int (1 + u^2) u^2 du = \int u^2 + u^4 du$$

$$= \frac{u^3}{3} + \frac{u^5}{5} + C = \boxed{\frac{\tan^3 \theta}{3} + \frac{\tan^5 \theta}{5} + C}$$

$$3. \int \cos^2(5x) dx$$

$$= \int \frac{1 + \cos(10x)}{2} dx = \int \frac{1}{2} + \frac{\cos(10x)}{2} dx$$

$$= \boxed{\frac{x}{2} + \frac{\sin(10x)}{20} + C}$$