Quiz 3 **Calculus 2** **9/22/2006**

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Evaluate $\int x \cos 2x \, dx$.

$u = x$ $\quad v = \frac{1}{2}\sin 2x$

$u' = dx$ $\quad v' = \cos 2x$

$\frac{x}{2}\sin 2x - \frac{1}{2}\int \sin 2x \, dx$

$\int \sin u \, du = -\cos u$

$u = 2x$

$\frac{du}{dx} = 2$ $\quad dx = \frac{du}{2}$

$\frac{x}{2}\sin 2x + \frac{1}{4}\cos 2x + C$

Excellent

2. Evaluate $\int \sin^3\theta \cos^2\theta \, d\theta$.

"save something odd"

$\sin^2\theta + \cos^2\theta = 1$

so $\sin^2\theta = (1 - \cos^2\theta)$

So...

$= \int \sin\theta (\sin^2\theta) \cos^2\theta \, d\theta$

$= \int \sin\theta (1 - \cos^2\theta) \cos^2\theta \, d\theta$ ⟶ Let $u = \cos x$. Then $\frac{du}{d\theta} = \sin\theta$.

$d\theta = \frac{du}{\sin\theta}$

$= \int \sin\theta (1 - u^2) u^2 \frac{du}{\sin\theta}$

$= \int (u^2 - u^4) \, du = \frac{u^3}{3} - \frac{u^5}{5} + C$ ⟵ plug back in your value of u

$= \frac{1}{3}\cos^3\theta - \frac{1}{5}\cos^5\theta + C$

Nicely done!