Math 152 - Spring 2013 - Quiz #3 Score: ________ out of 10.

Name: key

Show all work clearly and in order. Please box your answers. 10 minutes.

1. $\int \sec(x)dx$.

   A. $\ln|\sec(x)| + C$

   B. $\boxed{\ln|\sec(x) + \tan(x)| + C}$

   C. $-\ln|\cos(x)| + C$

   D. $\tan(x) + C$

2. $\int \sec^2(x)dx$.

   A. $\ln|\sec(x)| + C$

   B. $\ln|\sec(x) + \tan(x)| + C$

   C. $-\ln|\cos(x)| + C$

   D. $\boxed{\tan(x) + C}$

SOLVE 2 OF THE FOLLOWING INTEGRALS:

Please indicate which problems you do NOT want me to grade by putting a GIANT X through them, otherwise I will grade the first two worked on:

3. Evaluate $\int \sin^2(3x)dx$. $= \int\left(\frac{1}{2} - \frac{1}{2}\cos(6x)\right)dx$ (to get this answer you can do a u-substitution of $u = 6x$)

$= \boxed{\frac{1}{2}x - \frac{1}{12}\sin(6x) + C}$

4. Evaluate $\int \sec^4(x)dx$. $= \int \sec^2(x)\sec^2(x)dx = \int(\tan^2(x)+1)\sec^2(x)\,dx$

$u = \tan(x) \Rightarrow \frac{du}{dx} = \sec^2(x) \Rightarrow dx = \frac{du}{\sec^2(x)}$

$= \int(u^2+1)\cancel{\sec^2(x)}\cdot\frac{du}{\cancel{\sec^2(x)}}$

$= \int(u^2+1)\,du = \frac{u^3}{3} + u + C$

$= \boxed{\frac{\tan^3(x)}{3} + \tan(x) + C}$

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

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

$= \int \sin(3x)(1-\cos^2(3x))\cos^2(3x)dx$, $u = \cos(3x) \Rightarrow \frac{du}{dx} = -3\sin(3x) \Rightarrow dx = \frac{du}{-3\sin(3x)}$

$= \int \cancel{\sin(3x)}(1-u^2)\,u^2 \cdot \frac{du}{-3\cancel{\sin(3x)}} = -\frac{1}{3}\int(u^2-u^4)du = -\frac{1}{3}\left[\frac{u^3}{3} - \frac{u^5}{5}\right] + C$

$= \boxed{-\frac{\cos^3(3x)}{9} + \frac{\cos^5(3x)}{15} + C}$

6. Evaluate $\int_0^{\pi/8} \sqrt{1+\cos(4x)}dx$.

$\cos^2(2x) = \frac{1}{2} + \frac{1}{2}\cos(4x) \implies \cos(4x) = 2\cos^2(2x) - 1$

so $\int_0^{\pi/8}\sqrt{1+\cos(4x)}\,dx = \int_0^{\pi/8}\sqrt{1+(2\cos^2(2x)-1)}\,dx = \int_0^{\pi/8}\sqrt{2\cos^2(2x)}\,dx = \sqrt{2}\int_0^{\pi/8}|\cos(2x)|\,dx$

on the interval $[0,\pi/8]$, $\cos(2x) \geq 0$ so we have $\sqrt{2}\int_0^{\pi/8}\cos(2x)dx = \sqrt{2}\left[\frac{\sin(2x)}{2}\right]_0^{\pi/8} = \boxed{\frac{1}{2}}$