Math 271 - Fall 2012 - 8/30/2011 - Quiz #1 **Score:** _____ out of 10.

Name: Key

No Calculators. Show all work clearly and in order. Please box your answers. 10 minutes.

SOLVE 5 OF THE FOLLOWING INTEGRALS:

Please indicate which one you do NOT want me to grade by putting an X through it, otherwise I will grade the first one worked on:

1. $\int \left(x^4 + \frac{1}{x^4} + e^{3x}\right) dx = \int (x^4 + x^{-4} + e^{3x})dx = \boxed{\frac{x^5}{5} + \frac{x^{-3}}{-3} + \frac{e^{3x}}{3} + C}$

2. $\int \frac{dx}{1-3x}$ Let $u = 1-3x \Rightarrow$ so $\frac{du}{dx} = -3 \Rightarrow$ so $dx = \frac{du}{-3}$

$= \int \frac{1}{u} \cdot \frac{du}{-3} = -\frac{1}{3}\int \frac{1}{u}\,du = -\frac{1}{3}\ln|u| + C = \boxed{-\frac{1}{3}\ln|1-3x| + C}$

3. $\int \frac{dx}{x^2+1} = \boxed{\tan^{-1}(x) + C}$

4. $\int \tan(x)dx = \int \frac{\sin(x)}{\cos(x)}dx$ Let $u = \cos(x) \Rightarrow \frac{du}{dx} = -\sin(x) \Rightarrow dx = \frac{du}{-\sin(x)}$

$= \int \frac{\cancel{\sin(x)}}{u} \cdot \frac{du}{-\cancel{\sin(x)}} = -\int \frac{1}{u}\,du = -\ln|u| + C$

$= \boxed{-\ln|\cos(x)| + C}$

5. $\int x^2(\sqrt[3]{x})dx = \int x^2 \cdot x^{1/3}\,dx = \int x^{7/3}\,dx = \frac{x^{7/3+1}}{7/3+1} + C = \frac{x^{10/3}}{10/3} + C = \boxed{\frac{3}{10}x^{10/3} + C}$

6. $\int \cos^2(x)dx = \int \left(\frac{1+\cos(2x)}{2}\right)dx = \int\left(\frac{1}{2} + \frac{\cos(2x)}{2}\right)dx = \boxed{\frac{1}{2}x + \frac{\sin(2x)}{4} + C}$

NOTE: you can also use u-substitution to find the integral of $\cos(2x)$

7. $\int x\cos(x)dx = x \cdot \sin(x) - \int \sin(x)\,dx = x\sin(x) - (-\cos(x)) + C$

$= \boxed{x\sin(x) + \cos(x) + C}$

$u = x$ $\quad dv = \cos(x)dx$

$du = 1 \cdot dx$ $\quad v = \sin(x)$