Math 1152, Quiz #3, Spring 2014 Name KEY

Instructions: Show all work. Use *exact* answers unless specifically asked to round. You may check your answers in the calculator, but you must show work to receive credit.

1. Integrate.

a. $\int e^x sec^4(e^x)dx$ $u = e^x \quad du = e^x \Rightarrow \int sec^4 u \, du$

$\int sec^2 u (1 + tan^2 u) du = \int sec^2 u + tan^2 u \, sec^2 u \, du$

$w \quad dw$

$= tan u + \frac{1}{3} tan^3 u + C$

$= tan e^x + \frac{1}{3} tan^3 e^x + C$

b. $\int sin^2 x \, cos^2 x \, dx$ $\frac{1}{4}\int (1 - cos 2x)(1 + cos 2x) dx = \frac{1}{4}\int 1 - cos^2 2x \, dx$

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

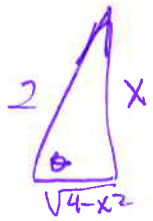
$\frac{1}{4}\int \frac{1}{2} - \frac{1}{2} cos 4x \, dx = \frac{1}{8}[x - \frac{1}{4} sin 4x] + C$

c. $\int \frac{dx}{x^2\sqrt{4-x^2}}$ $x = 2 sin\theta$

$dx = 2 cos\theta \, d\theta$

$\sqrt{4-x^2} = 2 cos\theta$

$\int \frac{2 cos\theta}{(2 sin\theta)^2 \, 2 cos\theta} d\theta$



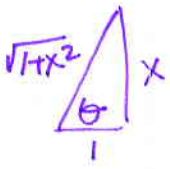
$= \frac{1}{4}\int csc^2\theta \, d\theta = -\frac{1}{4} cot\theta + C$

$= -\frac{1}{4}\left(\frac{\sqrt{4-x^2}}{x}\right) + C$

d. $\int \frac{(1+x^2)^{3/2} dx}{x^6}$ $x = tan\theta$

$dx = sec^2\theta \, d\theta$

$(1 + tan^2\theta)^{3/2} = (sec^2\theta)^{3/2}$



$= \int \frac{sec^3\theta \cdot sec^2\theta}{tan^6\theta} d\theta = \int \frac{cos^6\theta}{sin^6\theta} \cdot \frac{1}{cos^5\theta} d\theta = \int \frac{cos\theta}{sin^6\theta} d\theta =$

$u = sin\theta \quad du = cos\theta$

$\int u^{-6} du = -\frac{1}{5}u^{-5} = -\frac{1}{5} csc^5\theta + C = -\frac{1}{5}\left(\frac{\sqrt{1+x^2}}{x}\right)^5 + C$