Math 31 – Workshop #9

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1. The number ONE identity in trigonometry is the Pythagorean Identity, which says $\cos^2 x + \sin^2 x = 1$. Divide both sides of the equation by $\cos^2 x$. After simplifying, what new identity do you get?

2. Consider the integral $\displaystyle\int \tan x \sec^2 x \; dx$.

   (a) Explain why $u = \tan x$ is a possibly useful substitution.

   (b) Use this substitution to compute the integral.

3. Consider the integral $\displaystyle\int \tan x \sec^4 x \; dx$. Use the substitution $u = \tan x$ to compute this integral.

4. Compute the following integrals.

   (a) $\displaystyle\int \tan x \sin^2 x \; dx$

   (b) $\displaystyle\int \frac{\cos^5 x}{\sqrt{\sin x}} \; dx$

   (c) $\displaystyle\int \tan^3 x \; dx$

   (d) $\displaystyle\int \tan x \sin^2 x \; dx$

5. The double angle identity for cosine is $\cos(2x) = \cos^2 x - \sin^2 x$.

   (a) Using the Pythagorean Identity, replace $\cos^2 x$ with $1 - \sin^2 x$. Then solve this new equation for $\sin^2 x$.

   (b) Use what you did above to compute $\displaystyle\int \sin^4 x \; dx$.