Name: _____ **Section:** _____

Names of collaborators: _____

Main Points:

1. Use simple substitution
2. Use trig. identities

1. Using the Pythagorean Identity for Sine and Cosine

The Pythagorean identity $\sin^2 x + \cos^2 x = 1$ can be used with simple substitution to evaluate some trigonometric integrals. Read Examples 1 and 2.

Exercises

1. Use the Pythagorean identity $\sin^2 x + \cos^2 x = 1$ and simple substitution to evaluate the integrals.

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

   (b) $\int \sin^7 x \, \cos^5 x \, dx$

2. Using the Half-Angle Formulas

For some trig integrals the half-angle formulas are more useful. Read the paragraph after the conclusion of Example 2.

Exercises

2. State the half-angle formulas.

3. Use the half-angle formulas to rewrite the integrand, and then evaluate the integral.

   (a) $\int \cos^2\theta \, d\theta$

   (b) **Challenge.** $\int \sin^2\theta \, \cos^4\theta \, d\theta$

   Hint: You will need to use the half-angle formulas several times and use a simple substitution as well. Be careful, use parentheses, and be patient with yourself!

4. Explain how you can tell when it might be worthwhile to use the Pythagorean identity for sine and cosine and when it might be useful to use a half-angle formula instead.

3. Integrals with Tangent and Secant

Using the Pythagorean identity $\tan^2 x + 1 = \sec^2 x$ along with simple substitution is often useful for trig integrals involving tangent and secant. Read Examples 5 and 6.

Exercises

5. Evaluate the integrals:

   (a) $\int \tan^2 \theta \, \sec^4 \theta \, d\theta$.

   (b) $\int \tan x \, \sec^3 x \, dx$.

6. How can you tell when it might be useful to use the substitution $u = \tan x$ and when it might be better to use $u = \sec x$ instead?

7. State the antiderivatives of tangent and secant. (These formulas are in red boxes.)

4. Using Product-to-Sum Identities

Another set of identities, sometimes called "product-to-sum" identities can also be useful.

Exercises

8. State the three "product-to-sum" identities, given in the red box before Example 9.

9. Evaluate $\int \cos x \cos(4x)\, dx$.