

Section 8.4 - Trigonometric Integrals

1. We want to integrate $\int \sin^m x \cos^n x dx$. (Consider Cases)

2. Example #1: m is odd (Pythagorean identities, u -substitution with $u = \cos x$)

$$\int \sin^5 x \cos^2 x dx$$

3. Example #2: m is even and n is odd (u -substitution with $u = \sin x$)

$$\int \cos^3 x dx$$

4. Example #3: Both m and n are even $\left(\sin^2 x = \frac{1 - \cos 2x}{2}, \quad \cos^2 x = \frac{1 + \cos 2x}{2} \right)$

$$\int \sin^4 x \cos^2 x dx$$

5. Example #4: (Eliminating square roots-formula from Example 3; remember absolute value)

$$\int_0^{\pi/2} \sqrt{1 - \cos 4x} dx$$

6. Example #5: ($\sec x$ and $\tan x$)

$$\int_0^{\pi/12} 3 \sec^4 3x dx$$

7. Products of sines and cosines:

$$(a) \sin mx \sin nx = \frac{1}{2}[\cos(m-n)x - \cos(m+n)x]$$

$$(b) \sin mx \cos nx = \frac{1}{2}[\sin(m-n)x + \sin(m+n)x]$$

$$(c) \cos mx \cos nx = \frac{1}{2}[\cos(m-n)x + \cos(m+n)x]$$

8. Example #6:

$$\int_0^{\pi/2} \sin 2x \cos 3x dx$$