6.2 Trigonometric Integrals and Substitutions (part 1)

Trigonometric integrals like this: \[ \int \sin^m x \cos^n x \, dx \]

If \( m \) is an odd positive integer, let \( u = \)

If \( n \) is an odd positive integer, let \( u = \)

If both \( m \) and \( n \) are even nonnegative integers, then use the identities:

\[
\begin{align*}
\cos^2 x &= \\
\sin^2 x &= 
\end{align*}
\]

An identity that is often used in each of these cases is: \( \sin^2 x + \cos^2 x = 1 \)

EXAMPLES

1. \[ \int \frac{\cos^3 x}{\sqrt{\sin x}} \, dx \]

2. \[ \int \sin^2 x \, dx \]
3. \[ \int_{0}^{\pi/2} \cos^2 3x \, dx \]

4. \[ \int \sin^2 x \cos^2 x \, dx \]
Trigonometric integrals like this: \[ \int \tan^m x \sec^n x \, dx \]

If \( m \) is an odd positive integer, then normally let \( u = \)

If \( n \) is an even positive integer, then normally let \( u = \)

If \( m \) is an even positive integer and \( n \) is an odd positive integer, then a formula and/or integration by parts should be used.

In any case, the identity \( 1 + \tan^2 x = \sec^2 x \) is frequently used.

**EXAMPLES**

1. \[ \int \tan^3 x \sec^6 x \, dx \]

2. \[ \int \tan x \sec^6 x \, dx \]

Integrals of the type \[ \int \cot^m x \csc^n x \, dx \] are handled in the same manner as \[ \int \tan^m x \sec^n x \, dx \].

The important identity here is \( 1 + \cot^2 x = \csc^2 x \).