

AP Calculus BC  
Unit 8 – Integration Techniques

**Day 7 Notes: Trig Integrals with Powers of Secant & Tangent**

$$\int \sec^m(ax)\tan^n(ax)dx$$

**CASE 1: EVEN POWER OF SECANT**

*Save  $\sec^2x$  and convert the rest to  $\tan x$  using the identity  $\tan^2x + 1 = \sec^2x$*

**Example 1:**

$$\int \sec^4x\sqrt{\tan x}dx$$

**CASE 2: ODD POWER OF TANGENT**

*Save  $\sec x \tan x$  and convert the rest to  $\sec x$  using the identity  $\tan^2x + 1 = \sec^2x$*

**Example 2:**

$$\int \tan^3\left(\frac{\pi x}{2}\right) \cdot \sec^3\left(\frac{\pi x}{2}\right) dx$$

**CASE 3: EVEN POWER OF TANGENT, NO SECANT**

*Convert one  $\tan^2 x$  to  $(\sec^2 x - 1)$ . Repeat if necessary.*

**Example 3:**

$$\int \tan^4 x dx$$

**CASE 4: ODD POWER OF SECANT, NO TANGENT**

*Use integration by parts with  $dv = \sec^2 x$ .*

**Example 4:**

$$\int \sec^3 x dx$$

**CASE 5:** *When none of these work, convert everything to sines and cosines!!*

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Unit 8 – Day 7 – Assignment

Name: \_\_\_\_\_

Evaluate the indefinite integral.

1)

$$\int \sec 3x dx$$

2)

$$\int \sec^2 x \tan x dx$$

3)

$$\int \tan^3 2x \sec^3 2x dx$$

4)

$$\int \sec^4 5x dx$$

5)

$$\int \sec^3 \pi x dx$$

6)

$$\int \frac{\tan^2 x}{\sec^5 x} dx$$

7)  $\int \tan^2 x \sec^2 x dx$

8)  $\int \tan^2 x dx$