**AP Calculus BC**
**Unit 8 – Integration Techniques**

# Day 6 Notes: Trig Integrals with Powers of Sine & Cosine

$$\int sin^m(ax)cos^n(ax)dx$$

## CASE 1: ODD POWER OF SINE

*Save one factor of sine, then convert the rest to cosine using the identity*

$$sin^2x = 1 - cos^2x$$

| **Example 1:** | **Example 2:** |
| --- | --- |
| $\int sin^3xdx$ | $\int sin^5(4x) \cdot \cos(4x)dx$ |

## CASE 2: ODD POWER OF COSINE

*Save one factor of cosine, then convert the rest to sine using the identity*

$$\cos^2 x = 1 - \sin^2 x$$

**Example 3:**

$$\int \cos^3 x \cdot \sin^2 x \, dx$$

## CASE 3: EVEN POWERS OF SINE AND COSINE

*Make repeated use of these identities:*

$$\cos^2 x = \tfrac{1}{2}(1 + \cos 2x)$$

$$\sin^2 x = \tfrac{1}{2}(1 - \cos 2x)$$

**Example 4:**

$$\int \cos^2 x \cdot \sin^2 x \, dx$$

**Example 5:**

$$\int \cos^4 x \, dx$$

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**Unit 8 – Day 6 – Assignment**

**Evaluate the indefinite integral.**

| | |
|---|---|
| 1) $\int cos^3 x sin^4 x dx$ | 2) $\int sin^5 2x cos 2x dx$ |
| 3) $\int sin^5 x cos^2 x dx$ | 4) $\int cos^3\left(\frac{x}{3}\right) dx$ |

5) $\int \frac{sin^5 x}{\sqrt{cosx}} dx$

6) $\int cos^2(3x) dx$

7) $\int x sin^2 x dx$