TOPIC: INTEGRALS OF BASIC TRIG FUNCTIONS

Integrals Resulting in Basic Trig Functions

◆ Just like with power functions, finding the integral of trig functions is just the _____ of finding the derivative.

Recall: Derivatives of Sine & Cosine	New: Integrals of Sine & Cosine
$\frac{d}{dx}\sin x = \cos x$	$\int \cos x\,dx = \_\_\_\_\_ + C$
$\frac{d}{dx}\cos x = -\sin x$	$\int \sin x\,dx = \_\_\_\_\_ + C$

EXAMPLE Find the indefinite integral.

(***A***) $\int (3\sin x + 2\cos x)\,dx$

New

$\int \sec^2 x\ dx = \tan x + C$

$\int \csc^2 x\ dx = \quad \cot x + C$

$\int \sec x \tan x\,dx = \sec x + C$

$\int \csc x \cot x\,dx = \quad \csc x + C$

(***B***) $\int (7\sec x \tan x - \csc^2 x)\,dx$

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PRACTICE Find $g(\theta)$ by evaluating the following indefinite integral.

$$g(\theta) = \int (5\sec^2\theta - 2\csc^2\theta)d\theta$$

PRACTICE Find $g(x)$ by evaluating the following indefinite integral.

$$g(x) = \int (\sin^2 x - 100\csc x \cot x + \cos^2 x)dx$$

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EXAMPLE Verify the following indefinite integral by differentiation.

$$\int \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx = 2\sin\sqrt{x} + C$$

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EXAMPLE Evaluate the indefinite integral.

$$\int \cos t \cdot \sin^{99} t \; dt$$

PRACTICE Evaluate the indefinite integral.

$$\int \theta \cdot \sec^2(5\theta^2 + 1) \; d\theta$$

HOW TO: Evaluate Indefinite Integral with Substitution

1) Choose $u = g(x)$ (**inside** fcn), then find $du = g'(x)\,dx$

2) Rewrite int. ***only*** in terms of u & du; *If needed*: Mult. by constant & reciprocal

3) Integrate with respect to u

4) Replace u with $g(x)$

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PRACTICE Evaluate the definite integral.

$$\int_{-\pi/4}^{\pi/4} \tan y \sec^2 y \ dy$$