Calc AB

Lesson 35

9/10/15

Agenda: 9/10/15

HW leader:

Lesson 35

Integral of a constant
$K \cdot f(x)$ and x^n
$\sin(x)$, $\cos(x)$, e^x

★ Quiz 4 tomorrow
Lessons 29-33

Period 3	Period 4
Lucas K.	Avery N.

Terms used interchangeably: Integration
Indefinite integration
antidifferentiation

Important:
$$\frac{d}{dx}\left[\int f(x)\,dx\right] = f(x)$$
BUT: $$\int \frac{d}{dx} f(x)\,dx = f(x) + C$$

If K is any real number:

$$\int K\,dx = Kx + C \qquad \text{because} \quad \frac{d}{dx}(Kx + C) = K$$

Where C is the constant of integration.

$$\int K \cdot f(x)\,dx = K\int f(x)\,dx \qquad \text{because} \quad \frac{d}{dx}\left[\int K f(x)\,dx\right] = Kf(x)$$

$$\frac{d}{dx}\left[K\int f(x)\,dx\right] = K\frac{d}{dx}\left[\int f(x)\,dx\right] = Kf(x)$$

★ Never move a variable across the integral sign!

$$\int \sin(x)\,dx = -\cos(x) + C \qquad \text{because} \quad \frac{d}{dx}(-\cos(x) + C) = \sin(x)$$

$$\int \cos(x)\,dx = \sin(x) + C \qquad \text{because} \quad \frac{d}{dx}(\sin(x) + C) = \cos(x)$$

$$\int e^x\,dx = e^x + C \qquad \text{because} \quad \frac{d}{dx}(e^x + C) = e^x$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C \qquad \text{because} \quad \frac{d}{dx}\left(\frac{x^{n+1}}{n+1} + C\right) = x^n$$

Except $n = -1$

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$\int \frac{1}{x}\,dx = \ln|x| + C$ because $\frac{d}{dx}(\ln|x| + C) = \frac{1}{x}$

Ex. 35.4 Find $\int \frac{1}{3}\sqrt[3]{t^2}\,dt = \frac{1}{3}\int t^{2/3}\,dt$

$$= \frac{1}{3}\left[\frac{t^{2/3+1}}{2/3+1}\right] + C$$

$$= \frac{1}{3}\, t^{5/3} \cdot \frac{3}{5} + C$$

$$= \boxed{\frac{1}{5}\, t^{5/3} + C}$$

Ex. Find $\int \frac{5u^3}{u^\pi}\,du = 5\int u^{3-\pi}\,du$

$$= 5\left[\frac{u^{4-\pi}}{4-\pi}\right] + C$$

$$= \boxed{\frac{5u^{4-\pi}}{4-\pi} + C}$$