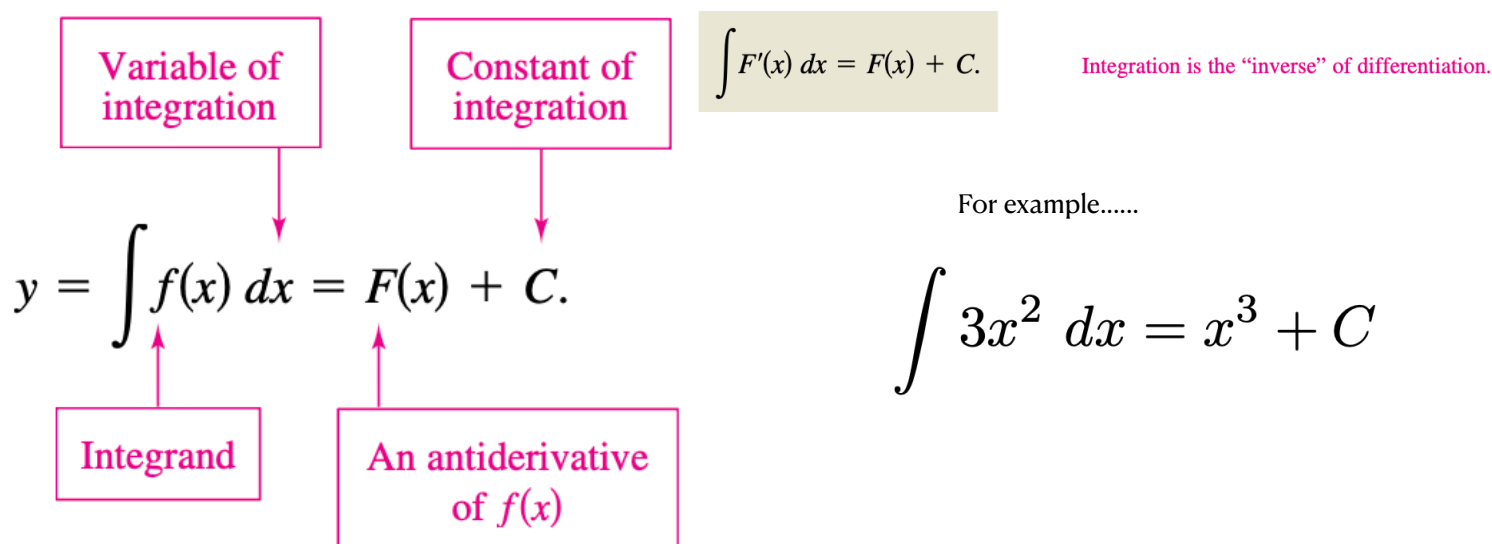


# **Intro to Antiderivatives**

## **Section 4.1**



because the derivative of  $x^3 = 3x^2$

the derivative of  $x^3 + 100 = 3x^2$

the derivative of  $x^3 + \pi^{17} = 3x^2$

the derivative of  $x^3 + C = 3x^2$  for ANY constant  $C$

$$5. \int \left( -\frac{6}{x^4} \right) dx = \frac{2}{x^3} + C$$

add 1 to the exponent,  
divide by the new exponent

$$\int -6x^{-4} dx = -6 \int x^{-4} dx = -6 \left( \frac{x^{-3}}{-3} \right) + C$$

$$\text{Notice } \frac{d}{dx} \left( \frac{2}{x^3} \right) = \frac{d}{dx} (2x^{-3}) = -3 * 2x^{-4} = -\frac{6}{x^4}$$

$$7. \frac{dy}{dt} = 9t^2$$

(You can confirm  
by taking the derivative  
of this)

	Original Integral	Rewrite	Integrate	Simplify
a.	$\int \frac{1}{x^3} dx$	$\int x^{-3} dx$	$\frac{x^{-2}}{-2} + C$	$-\frac{1}{2x^2} + C$
b.	$\int \sqrt{x} dx$	$\int x^{1/2} dx$	$\frac{x^{3/2}}{3/2} + C$	$\frac{2}{3}x^{3/2} + C$
c.	$\int 2 \sin x dx$	$2 \int \sin x dx$	$2(-\cos x) + C$	$-2 \cos x + C$

add 1 to the exponent,  
divide by the new exponent

**Original Integral**

**Rewrite**

**Integrate**

**Simplify**

11.  $\int \sqrt[3]{x} \, dx$

$$\int x^{1/3} \, dx = \frac{x^{4/3}}{\frac{4}{3}} + C = \frac{3}{4} x^{4/3} + C$$

(You can confirm  
by taking the derivative  
of this)

12.  $\int \frac{1}{4x^2} \, dx$

$$\frac{1}{4} \int x^{-2} \, dx = \frac{1}{4} \left( \frac{x^{-1}}{-1} \right) + C = -\frac{1}{4x} + C$$

14.  $\int \frac{1}{(3x)^2} \, dx$