

Section 6.1: Antiderivatives and Indefinite Integrals

Example: Given y' , find the function y .

$$y' = 2x$$

$$y' = 3x^2$$

Definition: A function $j(x)$ is said to be an **antiderivative** of $f(x)$ if $j'(x) = f(x)$.

Antiderivative Rules

Note: the following are what is called indefinite integrals. The symbols are telling us to take an antiderivative.

$$\int k \, dx =$$

$$\int x^n \, dx =$$

$$\int x^{-1} \, dx =$$

$$\int e^{kx} \, dx =$$

$$\int f(x) \pm g(x) \, dx =$$

$$\int kf(x) \, dx =$$

Example: Evaluate the following.

A) $\int x^3 + 5x^2 + 2 \, dx =$

B) $\int \sqrt{x^3} + \frac{1}{x^6} + x^8 \, dx =$

C) $\int (3x + 2)(x + 4) \, dx =$

$$D) \int \frac{1}{3x^8} + \frac{4}{x} + e^{2x} dx =$$

$$E) \int \frac{x^4 + 3x + 1}{x^2} dx =$$

$$F) \int 6e^{2x} + \frac{1}{e^{3x}} dx =$$

Example: Find $f(x)$ if $f(1) = 8$ and $f'(x) = 4x^3 + 3x^2 - 2x + 1$

Example: Find the revenue function if the marginal revenue function is $R'(x) = 9x^2 + 10e^x$