

## Indefinite Integrals

### Part 1: Overview

Question: The derivative of what function (or functions) is  $f'(x) = 3x^2$ ?

The process of finding antiderivatives (as we did above) is called integration.

We would use the following notation to in the integration process:

**Example 1:**  $\int 4x^3 dx$

**Example 2:**  $\int 1 dx$ ,  $\int x dx$ ,  $\int x^2 dx$ ,  $\int x^3 dx$ , ...

Formula for antiderivatives:  $\int x^n dx$

**Part 2: Examples (ad nauseum)**

**Example 3:**  $\int 16x^9 dx$

**Example 4:**  $\int (x^4 - 9x^2 + 3) dx$

**Example 5:**  $\int (17 + \sqrt[3]{x}) dx$

**Example 6:**  $\int \frac{6 dx}{x^3}$

**Example 7:**  $\int \left( 3x^8 + \frac{4}{x^8} - \frac{5}{\sqrt{x}} \right) dx$

**Part 2: Applications (time permitting)**

**Example 8:** If the marginal revenue (\$/unit) for a month is given by  $\overline{MR} = -0.3x + 450$ , what is the total revenue from the production and sale of 50 units?

**Example 9:** Suppose a projectile is launched straight up with velocity given by  $v(t) = 320 - 32t$  (measured in feet per second). After 10 seconds the projectile is 1600 feet above the launch point. When does the object hit the ground?