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12.1 Indefinite Integrals

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

The process of finding antiderivatives is called integration. We use the notation:

$$\int 3x^2 dx = x^3 + C.$$

Ex 1: $\int 4x^3 dx$

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

Formula: $\int x^N dx = \frac{x^{N+1}}{N+1} + C$, $N \neq -1$.

Ex 3: a) $\int 16x^9 dx$

b) $\int (x^4 - 9x^2 + 3) dx$

c) $\int (17 + \sqrt[3]{x}) dx$

d) $\int \frac{6}{x^5} dx$

e) $\int (3x^8 + \frac{4}{x^8} - \frac{5}{\sqrt{x}}) dx$

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Ex4: If the marginal revenue (\$/unit) for a mo. is given by $\overline{MR} = -0.5x + \frac{450}{2}$, what is the total Rev from the production & sale of 50 units.

Ex5: Suppose a projectile is shot up so that height is changing according to $v = 320 - 32t$ ft/s. After 10 sec. it is 1600 ft up. When does it hit the ground?