

3.9 Videos Guide

3.9a

Definition: (antiderivative)

- A function F is called an antiderivative of f on an interval I if $F'(x) = f(x)$ for all x in I .

Exercise:

- Find the most general antiderivative for the function.

$$f(x) = 6x^2$$

- Antiderivatives and falling objects

3.9b

- Antiderivatives of some trigonometric functions
- The Power Rule for antidifferentiation

- If $F'(x) = x^n$, then $F(x) = \frac{x^{n+1}}{n+1}$

That is, add 1 to the exponent, and then divide by the new exponent

Exercise:

- Find f .

$$f'''(t) = \sqrt{t} - 2 \cos t$$

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Exercises:

- Find f .

- $f'(x) = \sec^2 x$, $f\left(\frac{\pi}{4}\right) = 5$

(Note: In the above example, the information $f\left(\frac{\pi}{4}\right) = 5$ is called an initial condition.)

- $f'(x) = \frac{x+1}{\sqrt{x}}$, $f(1) = 5$

- $f'''(x) = 20x^3 + 12x^2 + 4$, $f(0) = 8$, $f(1) = 5$