

Using the Limit Definition of The Derivative

1. Write down the limit definition of the derivative. What are two meanings of the derivative that we stated in class?

2. Find the derivative of the following functions using the limit definition of the derivative.

(a) $f(t) = 2.5t^2 + 6t$

(b) $f(t) = \frac{1}{\sqrt{t}}$

Computing Derivatives using the Power, Product, and Quotient Rules

Compute the derivative of the functions below using rules up through Section 3.2 (power rule, sum rule, product rule, quotient rule).

Remark. Although the derivatives of $1/x = x^{-1}$ and $\sqrt{x} = x^{1/2}$ are special cases of the power rule, they come up often enough that they are worth memorizing so that you know them immediately when needed:

$$\frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{x^2} \quad \text{and} \quad \frac{d}{dx} \sqrt{x} = \frac{1}{2\sqrt{x}}.$$

3. $f(x) = 7x^3 - 5x + 8$

4. $f(x) = \sqrt{x} \cdot x^4$

5. $f(x) = \frac{1}{x} + \frac{1}{1-x}$

6. $f(x) = \frac{ax}{x+b}$, a and b are constants