

Key Concepts

- Derivatives

Derivatives represent a change of a certain function $f(x)$

- Examples

Let $f(x)$ represent a position of an object. Then the derivative, the change of the position of the object would be the velocity.

- Denoted: $f'(x)$ or $\frac{dy}{dx}$

- Definition of Derivatives

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

- **Remember** Cases where you still have to do limits

$$\frac{0}{0}, \pm\infty$$

- Example: Using the definition find the derivative of x^2

$$\lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h} = \lim_{h \rightarrow 0} 2x + h = 2x$$

Practice Problems

1. Using the definition of a derivative, find the derivative of the following functions

(a) $f(x) = x^3$ at $x = 3$

b) $f(x) = \frac{1}{4x+2}$

c) $f(x) = x^2 - 5x$

2. The quantity in kilogram of strawberry that is sold by a supermarket at a price of Z dollars per kilogram is represented as $P = f(Z)$
- a) What would the derivative, $f'(9)$ represent? What would the units be?
 - b) Is $f'(9)$ positive or negative? Explain your reasonings