Derivative/Slope/Rate of Change Graphs

\[ f'(x) = \text{slope of the tangent} = \text{instantaneous rate of change} = \text{the derivative} = \frac{df}{dx} \]

They all ask for the same thing!

Basic Rules:

1) Any relative minimum or maximum of \( f(x) \) will become an \( x \)-intercept on \( f'(x) \).

2) An inflection point on \( f(x) \) that is on an increasing slope will become a maximum on \( f'(x) \).

3) An inflection point on \( f(x) \) that is on a decreasing slope will become a minimum on \( f'(x) \).

- Exception: if an inflection point has a slope of zero, it will become a min/max still, but on the \( x \)-axis

4) Anywhere \( f(x) \) is increasing, \( f'(x) \) will be above the \( x \)-axis.

5) Anywhere \( f(x) \) is decreasing, \( f'(x) \) will be below the \( x \)-axis.

6) Anywhere \( f(x) \) is concave up, \( f'(x) \) will be increasing.

7) Anywhere \( f(x) \) is concave down, \( f'(x) \) will be decreasing.
Derivative / Slope / Rule of Change Graphs

Special / Confusing Cases

Try This!