

precalc notes 11.3

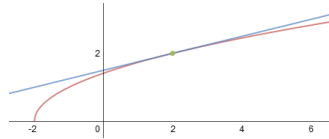
Precalc notes 11.3

The Tangent Line Problem

One of the key topics in the study of calculus is finding the slopes of lines that are tangent to a graph at a specific point. We can begin by "eyeballing" the slope of the line to get an idea of the concept.

- Find the slope of the tangent line for the given function at the given point.

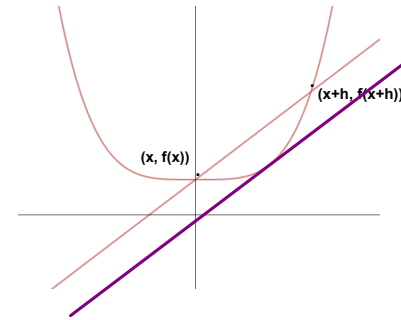
$$f(x) = \sqrt{x+2} \quad P(2, 2)$$



- Find the slope of the graph $f(x) = x^2+1$ at the point (3, 10).

- Find the slope of the graph $y = -\sqrt{x+2}$ at the point (-1, -1).

To be more precise with our slope calculation, we can use the difference quotient.



$$m = \frac{\Delta y}{\Delta x} = \frac{f(x+h) - f(x)}{h}$$

The equation for the slope of a graph at any given point is called the derivative. Some common ways it is written:

$$\frac{dy}{dx} \quad f'(x) \quad \frac{d}{dx}[f(x)] \quad D_x[y]$$

Find a formula for the slope of f at $(x, f(x))$ then use it to find the slope at the given points.

$$4) f(x) = x^3 \quad (-1, -1) \text{ and } (2, 8)$$

$$5) f(x) = \frac{1}{x-3} \quad (2, -1) \text{ and } (-2, -1/5)$$

precalc notes 11.3

Find the derivative of the function.

6) $f(x) = x^2 + 5x$

7) $f(x) = \sqrt{x+5}$

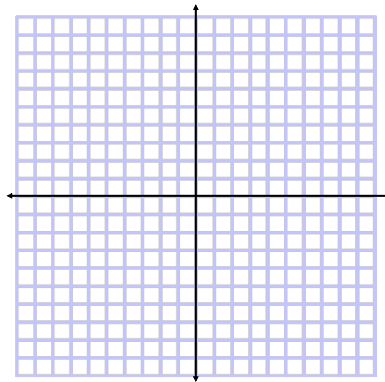
Find the derivative of the function.

8) $f(x) = \frac{1}{x-3}$

9) Find the slope off at the given point and then find the equation for the line tangent to the graph at the point. Also, sketch the graph and the tangent line.

$$f(x) = \sqrt{2x+1}$$

(4, 3)



10) Find the derivative and use it to determine any points where the tangent line is horizontal.

$$f(x) = x^2 + 4x - 2$$