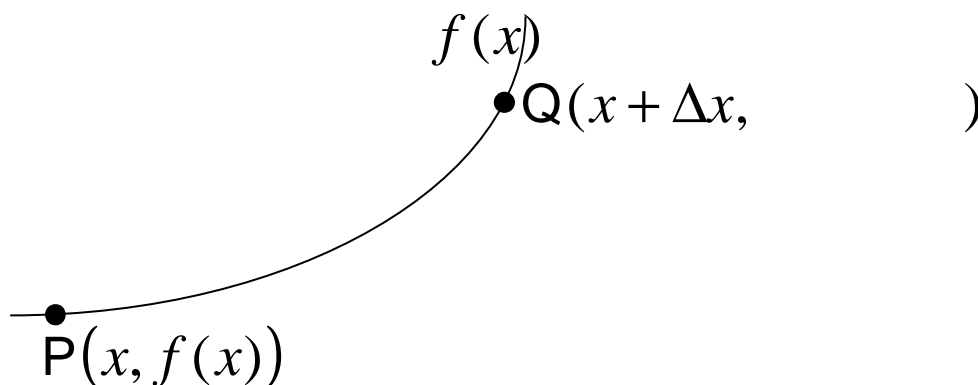


Calculus BC

Section 2.1 - The Derivative and the Tangent Line Problem



- Find the slope of the line containing P and Q
- As Q approaches P, what happens to the value h ?
- As Q approaches P, what do we end up calling the line \overrightarrow{PQ} ?
- What is the slope of the _____ at P ?

Definition of the derivative of a function:

$$f'(x) =$$

Other notations for the derivative: $\frac{dy}{dx}$, y' , $\frac{d}{dx} f(x)$, $D_x(y)$

1. Find the slope of the tangent line (using the definition) at any point P on the parabola

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

2. a) Using the definition of the derivative, find the slope of the tangent line at any point P of $f(x) = x^2 - 2x$.

b) Find the slope at the point $x = 3$ then write the equation of the tangent line at that point.
(use point slope form).

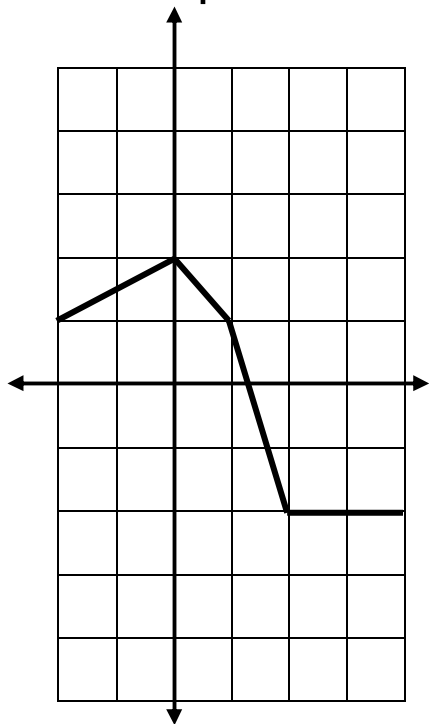
3. Using the definition, find the derivative (the slope of the tangents) of the function

$$f(x) = \frac{1}{x}$$

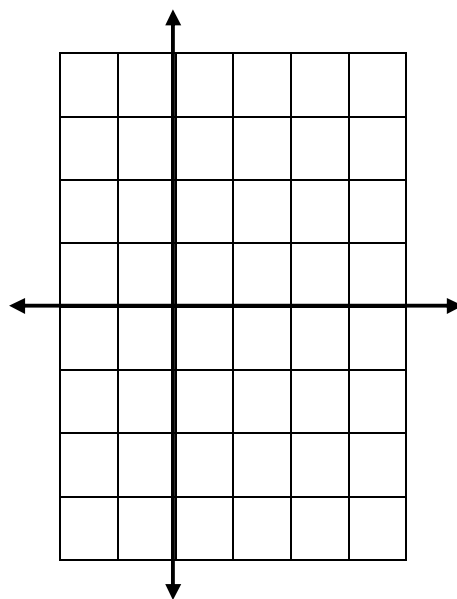
4. Using the definition, find the derivative of the function

$$f(x) = \sqrt{x}$$

5. Graph the derivative:



$f(x)$



$f'(x)$

Note: The derivative does not exist at points where there are corners, jumps, or vertical tangents.



Differentiability means the existence of the derivative.

Differentiable functions:

- polynomials, logarithmic, exponential, trig.
- composites, sum, difference, product, quotient, and powers of differentiable functions.

Differentiability \Rightarrow Continuity