

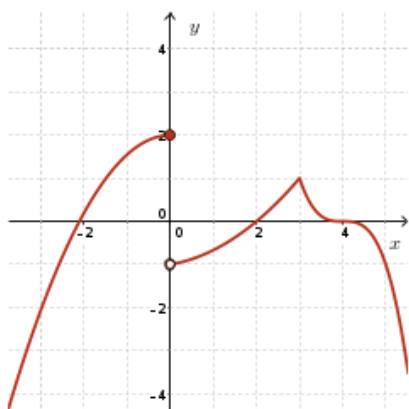
First Name: _____ Last Name: _____ Student ID: _____

Derivatives (1)

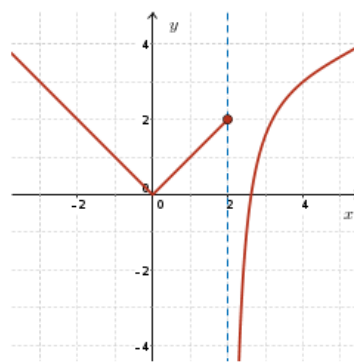
1. If $f(a) = 0$ and $f'(a) = 15$, find $\lim_{h \rightarrow 0} \frac{f(a+h)}{5h}$.

2. State the domains of $f(x)$ and $f'(x)$ for each function $f(x)$ whose graph is given below.

a.



b.



3. Using the definition of the derivative (First Principle), find $f'(x)$ for each function $f(x)$. State the domain of the functions $f(x)$ and $f'(x)$.

a. $f(x) = \sqrt{4 - 2x}$

b. $f(x) = \frac{1}{x+3}$

4. The derivative of the function $f(x) = \sqrt{x}$ is $f'(x) = \frac{1}{2\sqrt{x}}$ for all $x > 0$. If $\lim_{h \rightarrow 0} \frac{\sqrt{4+h}-2}{h} = \frac{1}{k}$, then what is the value of k ?

5. Draw a possible graph of a function $f(x)$ with the given description.

- a. f is continuous on all of \mathbb{R} , but f is not differentiable at $x = 1$.
- b. f is continuous at all x except for $x = 2$ and the tangent line to f at the point $(0, 2)$ is a vertical line.

6. The tangent line to a curve $y = f(x)$ at $x = 2$ passes through the points $(0, 10)$ and $(3, 40)$. What are the values of $f(2)$ and $f'(2)$?

7. The tangent line to a curve $y = f(x)$ at $x = 1$ passes through the point $(4, 9)$. If $f(1) = 1$, then what is the value of $f'(1)$?

8. The tangent line to a curve $y = f(x)$ at $x = 1$ has x -intercept $\frac{1}{2}$ and y -intercept -3 . What are the values of $f(1)$ and $f'(1)$?

9. Find the equations of the tangents to the curve $y = x^2 - 3x$ that pass through the point $(-1, 0)$.

10. Find the x and y coordinates of all points on the graph of $y = (2x - 1)(x^2 + 1)$ where the tangent line is perpendicular to the line $y = -\frac{1}{2}x + 3$.

11. Given $g(2) = 4$, $g'(2) = -\frac{1}{3}$, $h(2) = 3$, and $f'(2) = 3$, find $h'(2)$ if $f(x) = g(x)h(x)$.

12. If f , g and h are differentiable at x then so is fgh , find a formula for $[f(x)g(x)h(x)]'$.