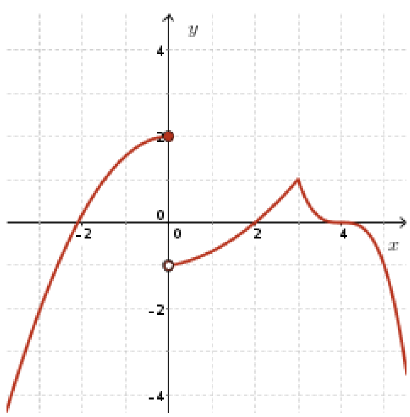
First Name:____________________ Last Name: _________________ Student ID: ________

Derivatives (1)

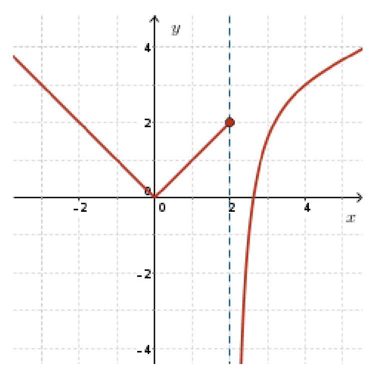
1. If $f(a)=0$ and $f'(a)=15$, find $\lim_{h\to 0}\frac{f(a+h)}{5h}$.

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 $\lim_{h\to 0} \frac{\sqrt{4+h}-2}{h} = \frac{1}{k}$, 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 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 $y = (2x-1)\cdot(x^2+1)$ 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 f·g·h find a formula for $[f(x)\cdot g(x)\cdot h(x)]'$.