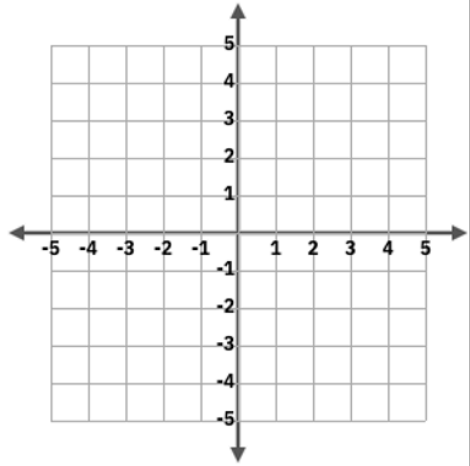
Name: ____________________________ Period: ______

LESSON 3.2: Derivatives of Inverse Functions

WARM UP

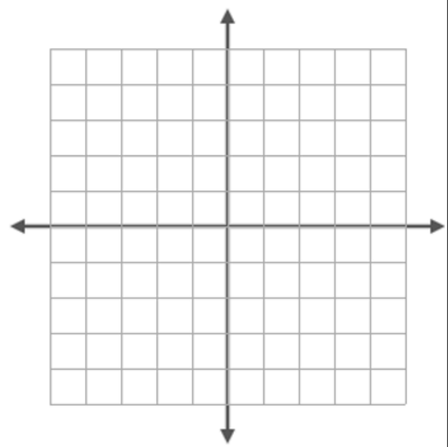
1. Given $f(x) = x^3 + 1$, find $f^{-1}(x)$. Then, graph $f(x)$ and $f^{-1}(x)$ on the set of axes at right.



2. Find $f'(x)$ at (2,9) and $(f^{-1})'(x)$ at (9,2). What do you notice?

PROPERTIES OF inverse functions

In order to have an inverse function, the original function must be _______________ .



This means, for each input, there is exactly one _______________ output.

Assuming some function $f(x)$ is one-to-one, then $f^{-1}(x)$ is its inverse function.

- The graph of $f^{-1}(x)$ is a reflection of $f(x)$ over the line _____________ .
- If $f(x)$ contains the point (a, b), then $f^{-1}(x)$ contains the point __________ .
    - These are called _______________ points.
    - The slope of the tangent line at image points are ________________ of one another:

DERIVATIVES OF *inverse functions*

Example: Given $f(x)$ has inverse $g(x)$, use the information in the table below to answer the following questions.

$f(-1) = 2$	$f(2) = 5$	$f(-4) = 0$
$f'(-1) = \frac{1}{2}$	$f'(2) = \frac{3}{4}$	$f'(-4) = \frac{1}{4}$

*Note: some evaluations may not be possible, in that case explain why the derivative can't be evaluated.

1. $g'(-1) =$

2. $g'(2) =$

3. $g'(0) =$

4. $g'(5) =$

5. $g'(-4) =$

6. $g'(3) =$