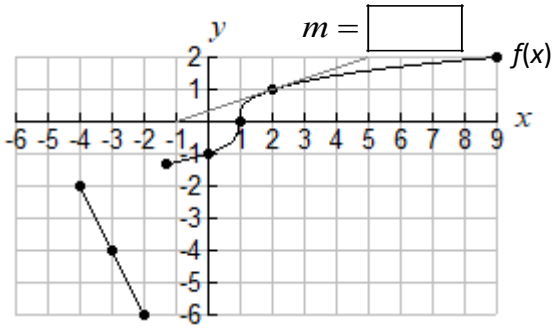
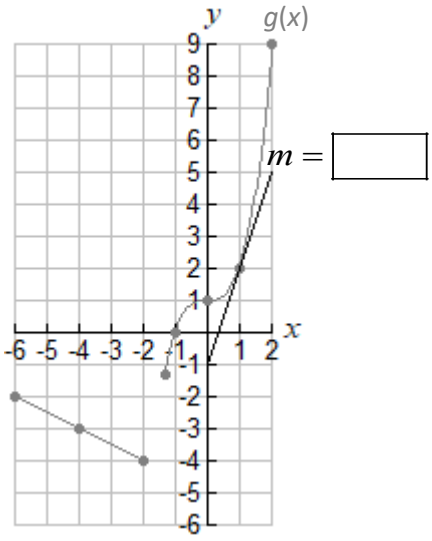
What's your Slope?

1. Observe carefully how the graphs of $f(x)$ and $g(x)$ are related, as well as their derivatives.
   A. The graph of a discontinuous function $f(x)$ is shown below, along with its tangent line at (2, 1). Complete the box with the slope of the tangent line to $f(x)$ at (2, 1) and complete the table.



x	$f(x)$	$f'(x)$
−2		
0	−1	1/3
1	0	undefined
2	1	
9		1/12

   B. The graph of a discontinuous function $g(x)$ is shown below, along with its tangent line at (1, 2). Complete the box with the slope of the tangent line to $g(x)$ at (1, 2) and complete the table. How can part A help you with the last row?

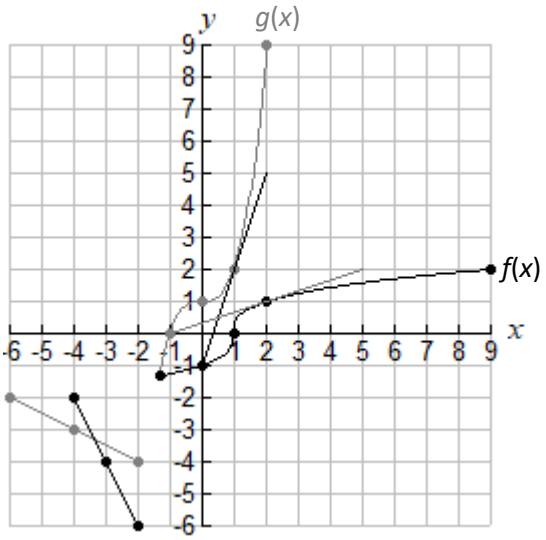


x	$g(x)$	$g'(x)$
	−2	
−1	0	3
0	1	0
1	2	
	9	

   C. Complete: The graph of f and g are called _____ of each other.
   If the point (a, b) is on the graph of f, then the point (__ , __) is on the graph of g.

   $f'(a)$ = ☐ (Write in terms of g.)

   $g'(b)$ = ☐ (Write in terms of f.)



2. What do you notice about any symmetry between the graphs of $f(x)$ and $g(x)$?

   What do you notice about any symmetry between the tangent lines at corresponding points?

Section 3.10 — Derivatives of Inverse Functions

Important Ideas:

Check Your Understanding!

1. For $f(x) = 3x + 6$, find $(f^{-1})'(x)$. You do not need to find $f^{-1}(x)$.

2. Let $f(x) = x^3 + x$. If $g(x) = f^{-1}(x)$ and $g(2) = 1$, what is the value of $g'(2)$?

3. The table below gives selected values for a differentiable and decreasing function *f* and its derivative. If $f^{-1}(x)$ is the inverse function of *f*, what is the value of $(f^{-1})'(2)$?

x	$f(x)$	$f'(x)$
0	49	0
1	2	−8
2	−1	−80

4. Suppose that *g* is the inverse function of $f(x) = 3x^5 + 6x^3 + 4$. Find $g'(13)$. TIP: Use a table or a graph.

5. Find the equation of the tangent line to the *inverse* of $f(x) = x^5 + 2x^3 + x - 4$ at the point $(-4,0)$.