

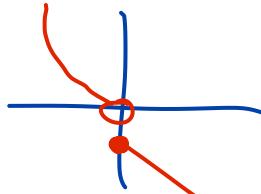
Math 135, Calculus 1, Fall 2020

Weekly Quiz 09-23

Show all work: clearly indicate your answer and the reasoning used to arrive at the answer.
Unsupported answers may not receive full credit.

Question 1 (6 points). Consider the function

$$f(x) = \begin{cases} 6x^2 & \text{if } x < 0 \\ -7x - 1 & \text{if } x \geq 0 \end{cases}$$



(a) Show that $f(x)$ is one-to-one.

- $6x^2 > 0$ for $x < 0$ & $-7x - 1 < 0$ for $x > 0$,
so no overlap there

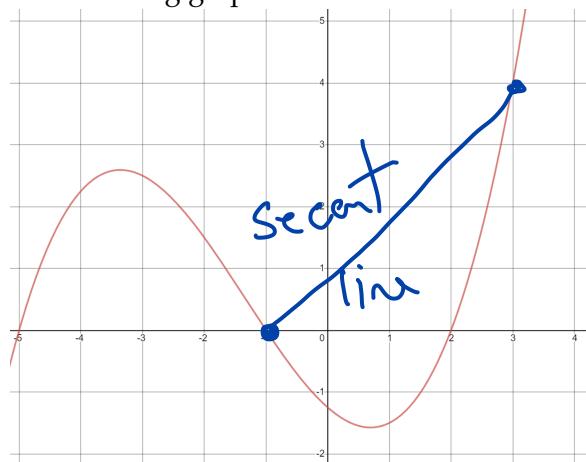
- $6x^2$ is 1-to-1 on $x < 0$, $-7x - 1$ is 1-to-1
(only repeats are ± 0) (lines are always so)

(b) Determine the inverse function $f^{-1}(x)$.

- Inverse of $y = 6x^2$ restricted to $-\infty < x < 0$: $\underline{-\sqrt{6x}}$ (rule when original > 0)
- Inverse of $y = -7x - 1$: $x = -7y - 1$
 $y = \frac{x+1}{-7}$
(rule when original < 0)

$$\boxed{f^{-1}(x) = \begin{cases} -\sqrt{6x} & x > 0 \\ \frac{x+1}{-7} & x \leq 0 \end{cases}}$$

Question 2. Compute the slope of the secant line over the interval $[-1, 3]$ of the function $g(x)$ with the following graph.



$$\begin{aligned} \text{slope} &= \frac{\Delta y}{\Delta x} = \frac{f(3) - f(-1)}{3 - (-1)} \\ &= \frac{4 - 0}{4} = \boxed{1} \end{aligned}$$