

MATH 1100-A 2008 Quiz 1

1. Find the domain and sketch the graph of

$$f(x) = \frac{2x - |x|}{x}.$$

Solution: The domain is $(-\infty, 0) \cup (0, \infty)$ or $\{x : x \neq 0\}$.

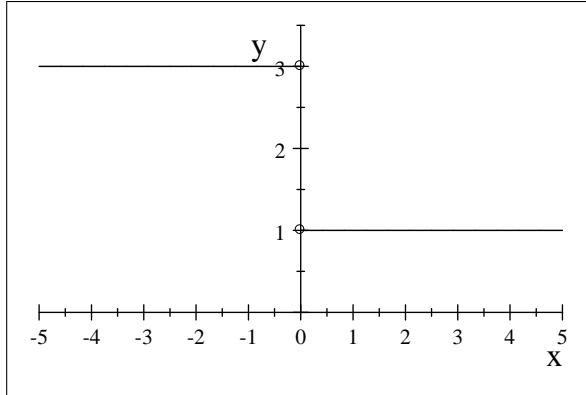
Since

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases},$$

we have

$$\begin{aligned} f(x) &= \begin{cases} \frac{2x-x}{x} & \text{if } x > 0 \\ \frac{2x+x}{x} & \text{if } x < 0 \end{cases}, \\ &= \begin{cases} 1 & \text{if } x > 0 \\ 3 & \text{if } x < 0 \end{cases}. \end{aligned}$$

The graph is



□

2. Find the functions $f \circ g$ and $g \circ f$ where

$$f(x) = x^2, g(x) = \frac{x-2}{3x+1}.$$

Do not simplify.

Solution:

$$\begin{aligned} f \circ g(x) &= f(g(x)) = f\left(\frac{x-2}{3x+1}\right) \\ &= \left(\frac{x-2}{3x+1}\right)^2. \end{aligned}$$

$$\begin{aligned} g \circ f(x) &= g(f(x)) = g(x^2) \\ &= \frac{x^2-2}{3x^2+1}. \end{aligned}$$

□