MATH310 Homework 2022-08-01
Due Gradescope 11:59pm 2022-08-03

1. Given the following functions f and $g \circ f$, what could g be? [25 pts]

$$\begin{aligned} f &= \{(1,3),(2,4),(3,4),(4,1)\} \\ g \circ f &= \{(1,3),(2,1),(3,1),(4,7)\} \end{aligned}$$

2. Define $f(x) = x$ for $x \in \mathbb{R}$ and $g(x) = |x|$ for $x \in \mathbb{R}$. Prove that: [25 pts]

$$\forall A \subseteq \mathbb{R},\ f\Big|_A = g\Big|_A \text{ iff } A \subseteq [0, \infty)$$

3. Suppose that $f : A \to B$. Prove that $f \circ I_A = f$. [25 pts]

4. Prove that the function $f(x) = \frac{x}{1-x}$ for $x > 1$ is increasing. [25 pts]