MATH310 Homework 2022-08-02
Due Gradescope 11:59pm 2022-08-04

1. Consider the function $f : \{1, 2, 3, 4\} \to \{1, 2, 3, 4\}$ given by $f = \{(1, 1), (2, 1), (3, 4), (4, 2)\}$ [20 pts]
   (a) What is the domain of f?
   (b) What is the range of f?
   (c) Is f surjective? Why or why not?
   (d) Is f injective? Why or why not?
2. Prove that the function $f : \mathbb{R} \to \mathbb{R}$ given by $f(x) = (x + 5)^3 + 4$ is surjective. [20 pts]
3. Prove that the function $f : \mathbb{R} - \{1, 4\} \to \mathbb{R}$ given by $f(x) = \frac{1}{(x-1)(x-4)}$ is not surjective. [20 pts]
4. Prove that the function $f : \mathbb{R} \to \mathbb{R}$ given by $f(x) = 2^x$ is injective. [20 pts]
5. Prove that the function $f : \mathbb{R} - \{1, 4\} \to \mathbb{R}$ given by $f(x) = \frac{1}{(x-1)(x-4)}$ is not injective. [20 pts]