

MAA 4102, MAA 5104
Homework 4
Due: Friday, February 3, 2017

Solve all problems and be sure to show all work. Answers with no supporting work will be given no credit.

1. For each function given, find the unique inverse, if one exists. You do not need to rigorously prove your inverse is as claimed, but be sure to write down the domain and co-domain of the functions and their inverses.

- (a) (p.38 1.5.2 (c))

$$f(x) = \frac{x}{x-1}$$

- (b) (p. 38, 1.5.2 (e)) For $x \in [0, 2]$,

$$f(x) = \sqrt{4 - x^2}.$$

2. (p. 39, 1.5.9) Show that if $f : A \rightarrow B$ is bijective, then $f = (f^{-1})^{-1}$.

3. (p.43 1.6.8)

- (a) Show that $(0, 1)$ is equivalent to $(-1, 1)$.
- (b) Show that $(-1, 1)$ is equivalent to \mathbb{R} .
- (c) From parts (a) and (b), construct an explicit bijection from $(0, 1)$ to \mathbb{R} , verifying that $(0, 1)$ is equivalent to \mathbb{R} .
- (d) From part (c), show that the set of all irrational numbers is uncountable.