

Worksheet 2.3 and 2.5

Max's Lecture
MATH 54

July 1, 2019

Exercise A (Charles wang's worksheet archive, 1.7.25). Let $f : A \rightarrow B$ be a one-to-one function. What are the compositions $f \circ f^{-1}$ and $f^{-1} \circ f$? i.e. what are their domains and codomains, and do you know another name for these functions?

Exercise B (Charles's worksheet repository). Let A be a set. Consider the set $S = \{f : A \rightarrow \{0, 1\}\}$ of functions from A to $\{0, 1\}$. Can you identify S in terms of a set construction you already know?

Exercise C . Give an example of a function that is:

1. one-to-one but not onto
2. onto but not one-to-one
3. niether one-to-one nor onto
4. one-to-one and onto

Exercise D (Charles worksheets). Show that any subset of a countable set is countable.

Exercise E. (Ritviks worksheet) Find the cardinality of each of the following. Explain.

1. The integers less than 10
2. The integers with absolute value less than 50.
3. The rational numbers
4. The real numbers between 0 and 2.
5. The set $A \times \mathbb{Z}^+$ where A is the set $\{1, 2\}$.

Exercise Challenge problem! Let A be a nonempty set. Show that there is no surjection from A to its power set.