

1. Text Exercise 0.3.4
2. Text Exercise 0.3.8
3. Text Exercise 0.3.13
4. Text Exercise 0.3.17
5. Text Exercise 0.3.20
6. Suppose $f : X \rightarrow Y$. Prove that $f^{-1}(f(A)) = A$ for every $A \subset X$ if and only if f is injective.
7. Give an example of a function f and sets A , X and Y such that $A \subset X$ yet $f^{-1}(f(A)) \neq A$.
8. Prove that if $|A \setminus B| = |B \setminus A|$ then $|A| = |B|$.

Hint: Let $f : A \setminus B \rightarrow B \setminus A$ be a bijection. Define

$$g(x) = \begin{cases} f(x) & \text{if } x \in A \setminus B \\ x & \text{if } x \in A \cap B \end{cases}$$

and now show that $g : A \rightarrow B$ is a bijection.