

Math 156: Workshop 8

Write your solutions neatly, or else points will be deducted.

- (p.228, #4)** There are eight different functions $f : \{a, b, c\} \rightarrow \{0, 1\}$. List them all (diagrams suffice).
- (p.228, #6)** Suppose $f : \mathbb{Z} \rightarrow \mathbb{Z}$ is defined as $f = \{(x, 4x + 5) : x \in \mathbb{Z}\}$. State the domain, codomain, and range of f .
- (p.232, #4)** (Note: It might help to read pages 230–231 before doing this problem.) Let $f : \mathbb{Z} \rightarrow \mathbb{Z} \times \mathbb{Z}$ be the function defined by $f(n) = (2n, n + 3)$. Prove or disprove whether the function is injective. Also prove or disprove whether the function is surjective.
- (p.232, #15)** (Note: It might help to read pages 230–231 before doing this problem.) Consider the function $\theta : \mathcal{P}(\mathbb{Z}) \rightarrow \mathcal{P}(\mathbb{Z})$ defined by $\theta(X) = \mathbb{Z} - X$, i.e., θ sends a subset of integers to its complement. Prove or disprove whether θ is injective. Also prove or disprove whether θ is surjective.