Math 112 Group problems, Monday Week 3

PROBLEM 1. Let $A := \{1, 2, 3, 4\}$ and $B := \{a, b, c\}$. Define $f \colon A \to B$ by $f(1) = f(3) = a$, $f(2) = b$, and $f(4) = c$.

(a) What are the domain and codomain of f?

(b) What is the formal definition of f as a relation (a subset of $A \times B$)?

(c) Is f injective? surjective? bijective?

PROBLEM 2. Consider the absolute value function:

$$f \colon \mathbb{R} \to \mathbb{R}$$
$$x \mapsto |x|.$$

(a) Draw the graph of f.

(b) What is $\operatorname{im}(f)$, the image of f?

(c) Is f injective? (Prove or provide a concrete counterexample.)

(d) Is f surjective? (Prove or provide a concrete counterexample.)

(e) How are the answers to the last two questions reflected in your drawing of the graph of f?

PROBLEM 3. Let $f \colon \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = 3x - 7$. Prove that f is bijective. (Follow the template.)