Concepts of Math: Recitation 10

September 30, 2015

Functions

1. Show that $f : \mathbb{N} \to \mathbb{N}$ defined by $f(x) = 2x - 3$ is NOT a function.

2. Define $f : \mathbb{Z} \to \mathbb{Z}$ by $f(x) = x^2 - 5x + 5$. Explain why f is a function. Is f injective? Is f surjective? Show all the work.

3. Define $f : \mathbb{Z} \to \mathbb{Z}$ by $f(x) = 3x^3 - x$. Explain why f is a function. Is f injective? Is f surjective? Show all the work.

4. A function $f : \mathbb{R} \to \mathbb{R}$ is injective if and only if every horizontal line intersects its graph at most once. A function $f : \mathbb{R} \to \mathbb{R}$ is surjective if and only if every horizontal line intersects its graph at least once. Explain this horizontal line test.

5. Define $f : \mathbb{R} \to \mathbb{R}$ by $f(x) = 3x^3 - x$. Is f injective? Is f surjective? Show all the work.

6. Define $f : \mathbb{R} \to \mathbb{R}$ by $f(x) = x^2$. Is f injective? Is f surjective? Show all the work.

7. Define $f : [0, \infty) \to \mathbb{R}$ by $f(x) = x^2$. Is f injective? Is f surjective? Show all the work.

8. Define $f : \mathbb{R} \to [0, \infty)$ by $f(x) = x^2$. Is f a function? Is f injective? Is f surjective? Show all the work.

9. Define $f : [0, \infty) \to [0, \infty)$ by $f(x) = x^2$. Is f a function? Is f injective? Is f surjective? Show all the work.