

Honors HW 10. Due Apr 26

1. Prove that the function below is a bijection from \mathbb{N} to \mathbb{Z} . Note that this explicitly shows \mathbb{N} and \mathbb{Z} are the same size

$$f(n) = \begin{cases} \frac{n}{2} & n \text{ is even} \\ \frac{-(n+1)}{2} & n \text{ is odd} \end{cases}$$

2. Show that if both f and g are onto functions then $f \circ g$ is also onto.
3. Consider $x^9 + 5x^3 + 3x^2$. Give an infinite Domain and Codomain that has the following properties (Give a counterexample when something is not one to one or onto):

(Hint: Graph it)

- (a) One to One: Yes, Onto: Yes
- (b) One to One: Yes, Onto: No
- (c) One to One: No, Onto: Yes
- (d) One to One: No, Onto: No