

# CS 1050 H: Understanding and Constructing Proofs

## *Homework 4*

*Due Tuesday, February 26*

1. Let  $A$  be a 10-element subset of  $\{1, 2, 3, \dots, 50\}$ . Show that  $A$  possesses two different 4-element subsets, the sum of whose elements are equal.

2. Evaluate the sum

$$1 - 1/2 + 1/4 - 1/8 \dots = \sum_{i=0}^{\infty} (-1/2)^i$$

3. Prove that the following three are equivalent:

- Well-ordering principle.
- First principle of induction.
- Second principle of induction.

You can use the fact proven in class that the first one above implies the second.

4. Compute the gcd of 420 and 247 using Euclid's algorithm. Also, express the gcd as an integer combination of 420 and 247.
5. Repeat previous question for 652 and 779.
6. When does a positive integer  $n$  have exactly 2, 3, 4 or 5 divisors, respectively?