

Quiz 2

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This quiz does not count towards your grade. It exists to simply gauge your understanding. Treat this as though it were a portion of your midterm or final exam. "Intuition Practice" might be tricky; watch out for subtleties. "Proofs" will be challenging to start; develop an arsenal of *approaches* to starting a problem.

1 Proofs

1. To Induction or Not

Prove that $\forall i, a \in \mathbb{N}$ where $x_1 = 1 \wedge x_i = i^2 + i + a - x_{i-1}$, the parity of x_i is opposite the parity of a . *Note: Parity is whether a number is even or odd.*

2. Look and Say

The look-and-say sequence is a sequence of numbers, where the next number is a translation into English of the previous term read aloud. The sequence begins with 1. For example, "11" would read "two 1s", which gives us the next term: "21". The next number after that is "1211".

- (a) Prove that all numbers in the look-and-say sequence end in 1.
- (b) Prove that no number in the look-and-say sequence will contain a digit greater than 3.