INTRODUCTION TO ABSTRACT MATHEMATICS — ASSIGNMENT 11.1
FALL 2018

Exercise 1. Recall that $\{0,1\}^{\mathbb{N}}$ is the set of all binary sequences.

- **a.** For $n \in \mathbb{N}$, let A_n be the subset of $\{0,1\}^{\mathbb{N}}$ whose rightmost nonzero entry is in the nth position. Show that A_n is finite.
- **b.** For $n \in \mathbb{N}$, let B_n be the subset of $\{0,1\}^{\mathbb{N}}$ whose rightmost zero entry is in the nth position. Show that B_n is finite.
- **c.** Use parts **a** and **c** to show that the subset C of $\{0,1\}^{\mathbb{N}}$ containing all sequences that terminate in either and infinite string of 0s or an infinite string of 1s is countable. [*Suggestion:* Remember that a countable union of countable sets is countable.]