Tutorial: Countably Infinite sets

1. Show that the set of integers $\mathbb{Z}$ is countable.

2. Show that the set of ordered triples over $\{1, 2, 3\}$ is countable.

3. Show that the language $L(a^*b + b^*a)$ is countable.

4. Show that the set of perfect squares $\{0, 1, 4, 9, \ldots\}$ is countable.

5. Show that the set "finite-length bit strings that are 0 or start with 1, $L(0 + 1(0+1)^*)$ is countable.

*6. Show that the set "finite-length bit strings" $L((0+1)^*)$ is countable, or argue that it is not.

7. Show that the set $Q^+ \times Q^+$, the ordered pairs of positive rationals is countable, Or argue that it is not.

6. $\{ (w_1, w_2) \mid w_1, w_2 \in L((a+b)^*) \}$.

Show this set is countable.

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