

Tutorial - Enumerating + Diagonalization.

March 11

For each set below, either prove it is uncountable or that it is countable.

1. $\mathbb{Z}^- = \{n \mid n \in \mathbb{Z}, n < 0\}$

2. $\{-3, -2, -1, 0, 1, 2, 3\}$

3. $L(a(a+b)^*a)$

4. $W \times W, \quad W = \{0, 1, 2, 3, \dots\}$

5. The set of all languages over $\{a, b\}$

6. The set of all regular languages over $\{a, b\}$

7. The set of even numbers.

8. The union of n countably infinite sets, where n is a finite integer.

9. The union of a countably infinite number of countably infinite sets.

4. $W \times W$ is countably infinite, as demonstrated by the following enumeration...

$$[\text{Recall } W \times W = \{ (0,0), (0,1), (1,0), (1,1), (0,2), \dots \}]$$

