MT231 - Analysis 1

Homework #2

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Problem 1

Let X be the set of all possible words in the English language. Prove that X is countable.

The set of words in the enlgish language is a finite set. Countable sets need to be either finite, or countably finite. Therefore set of enlgish words is countable.

Problem 2

Prove that the set of lines through the origin in $\mathbb{R}^2$ is countable

Problem 3

Let X be the open interval $(0, 1) \subset \mathbb{R}$ and let $S = \{(x, y) \mid 0 < x, y < 1\}$ be the open unit square.

Problem 4

Let $A \subset \mathbb{R}$. Prove that if a is an upper bound of A, and that if $a \in A$, then $a = lub(A)$

Problem 5

Let $A \subset \mathbb{R}$ and suppose that A is bounded below.

$$B = \{b \in \mathbb{R} \mid b \text{ is a lower bound for } A\}$$