Math 3520 - Quiz 5

Name:_____

Type proof in complete and **proper English**. Make certain to use **complete sentences** and **state what you are trying to prove**. Your work should stand on its own and be clear to you or a future student without any additional explanation. If it is not immediately clear to you it won't be clear to you in the future nor will it be clear to other students.

1. Write the definitions of countable, denumerable and uncountable.
2. Show the sets have the same cardinality by defining a function and showing it is a bijection.
   - $[0, 1)$ and $(2, 3]$
   - $\mathbb{Q}^+$ and $\mathbb{N}$
3. Prove $\mathbb{R}$ is not uncountable.
4. Prove the irrationals are uncountable.
5. Let A be countable and let B be countable. Prove $A \cup B$ is countable. In this proof construct a function from $\mathbb{N}$ to $A \cup B$. You may assume A and B are disjoint sets.
6. Let S be uncountable and let $T \subseteq S$ be countable. Prove $S \setminus T$ is uncountable. For this proof you may use Problem 5.