Math 4200
Sets

Definitions:

Two sets $A$ and $B$ are the same size (equinumerous) if there exists a function $f : A \rightarrow B$ such that $f$ is 1-1 and onto. $A$ is said to be equivalent to $B$ and we write $A \approx B$ or $|A| = |B|$.

For each $n$, let $J_n = \{1, 2, 3, \ldots, n\}$. A set $A$ is finite if $A = \emptyset$ or $A \approx J_n$ for some $n$.

A set $A$ is infinite if $A$ is not finite.

A set $A$ is countable if $A$ is finite or $A \approx J$.

A set $A$ is uncountable if $A$ is not countable.

Theorems:

If $A \subseteq B$ and $B$ is finite, then $A$ is finite.

If $A$ and $B$ are finite then $A \times B$ is finite.

If $A \subseteq B$ and $B$ is countable, then $A$ is countable.

If $A$ and $B$ are countable then $A \times B$ is countable.

$Q$, the set of rational numbers, is countable.

$R$, the set of real numbers, is uncountable.

Given any $A$, the power set of $A$, denoted by $P(A)$, is not equivalent to $A$. 