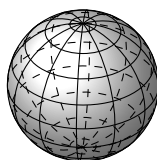


UNIVERSITY OF WATERLOO



PMATH 351

REAL ANALYSIS

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1 Axiom of Choice, Zorn's Lemma and Cardinality

1.1 Basic Notation

We will introduce some basic material that will be used throughout the rest of the course. We will use the following notation

- \mathbb{N} will denote the natural numbers $\{1, 2, 3, \dots\}$
- \mathbb{Z} will denote the set of integers $\{\dots, -2, -1, 0, 1, 2, \dots\}$
- \mathbb{Q} will denote the rational numbers $\{\frac{n}{m} : n \in \mathbb{Z}, m \in \mathbb{N}\}$
- \mathbb{R} will denote the set of real numbers

1.2 Basic Set Theory

We will use the notation $A \subset B$ and $A \subseteq B$ interchangeably to mean that A is a subset of B with the possibility that $A = B$ though when we explicitly wish to emphasize that $A = B$ is a possibility, we will generally use $A \subseteq B$. When we wish to express that A is a proper subset of B , then we can either specify further that $A \neq B$, or we can use the notation $A \subsetneq B$.