Math 351 Real Analysis I
McLoughlin's Class
The Axioms of Set Theory

Axiom 1) The Axiom of Extension Two sets are equal iff they have the same elements.

Axiom 2) The Axiom of Null There exists a set with no elements, call it $\varnothing$.

Axiom 3) The Axiom of Pairing Given any sets A and B, there exists a set C whose elements are A and B.

Axiom 4) The Axiom of Union Given any set A, the union of all elements in A is a set.

Axiom 5) The Axiom of Power Set Given any set A, there exists a set B consisting of all the subsets of A.

Axiom 6) The Axiom of Separation Given any set A and a sentence p(a) that is a statement for all $a \in A$, then there exists a set B = $\{ a \in A: \quad p(a) \text{ is true}\}$.

Axiom 7) The Axiom of Replacement Given any set A and a function *f* defined on A, the image *f*(A) is a set.

Axiom 8) The Axiom of Infinity There exists a set A such that $\varnothing \in A$, and whenever $a \in A$, it follows that $a \cup \{a\} \in A$.

Axiom 9) The Axiom of Regularity Given any non-empty set A, there exists an $a \in A$ such that $a \cap A = \varnothing$.

Axiom10) The Axiom of Choice Given any non-empty set A whose members are pairwise disjoint non-empty sets, there exists a set B consisting of exactly one element taken from each set belonging to A.