MATH 355: PRACTICE PROBLEMS

ALEXANDER LEE

1 The Real Numbers

1.2 Some Preliminaries.

Exercise (1)**.**

Exercise (4)**.**

Exercise (12)**.**

1.3 The Axiom of Completeness.

Exercise (1a)**.**

Exercise (1b)**.**

Exercise (5)**.**

Exercise (7)**.**

1.4 Consequences of Completeness.

Exercise (2)**.**

1.5 Cardinality.

Exercise (3a)**.**

Exercise (9)**.**

1.6 Cantor's Theorem.

Exercise (4)**.**

Exercise (6)**.**

2 Sequences and Series

2.2 The Limit of a Sequence. None.

2.3 The Algebraic and Order Limit Theorems.

Exercise (1)**.** (a) Let $\epsilon > 0$ be given. Since $(x_n) \to 0$, $\exists N \in \mathbb{N}$ such that for all $n \geq N$, we have $x_n = |x_n| = |x_n - 0| < \epsilon^2$. Hence, $\sqrt{x_n} < \epsilon$. Therefore, for all $n \geq N$, we have $\left|\sqrt{x_n} - 0\right| = \sqrt{x_n} < \epsilon$. Thus, $(\sqrt{x_n}) \to 0$.

(b) Let $\epsilon > 0$ be given.

Exercise (2)**.**

Exercise (9)**.**

2.4 The Monotone Convergence Theorem and a First Look at Infinite Series.

Exercise (3)**.**