MATH1220: Midterm 3 Study Guide

The following is an overview of the material that will be covered on the first exam.

§8.1 Indeterminate Forms of Type 0/0

- L'Hôpital's Rule for forms of type 0/0
- Repeated L'Hôpital's Rule for forms of type 0/0

§8.2 Other Indeterminate Forms

- L'Hôpital's Rule for forms of type ∞/∞
- Indeterminate forms of type $0 \cdot \infty$ and $\infty - \infty$
- Indeterminate forms of type 0^0, ∞^0, and 1^∞

§8.3 Improper Integrals: Infinite Limits of Integration

- Integrals of the form $\int_a^\infty f(x)\,dx$
- Integrals of the form $\int_{-\infty}^\infty f(x)\,dx$

§8.4 Improper Integrals: Infinite Integrands

- Integrals where the integrand is infinite at a limit of integration.
- Integrals of the form $\int_a^b f(x)\,dx$ where the $f(x)$ is infinite at some point in (a, b).

§9.1 Infinite Sequences

- The definition of a sequence.
- Writing a general formula when given a list of terms or a recursive formula.
- Writing a recursive formula when given a general formula or a list of terms.
- Writing a list of the first few terms when given a general or recursive formula.
- Computing the limit of a sequence by computing the limit of a function (e.g., Example 3 in §9.1).
- Applying the Squeeze Theorem to show a sequence converges.
- Using the Monotone Sequence Theorem to show a sequence converges.

§9.2 Infinite Series

- Deriving a formula for the n-th partial sum of a series.
- Conditions under which a geometric series converges, and computing the sum of a geometric series.
- Finding the sum of a collapsing series.
- The n-th term test for divergence.
- The harmonic series.

§9.3 Positive Series: The Integral Test

- The Integral Test (make sure the hypotheses are satisfied).
- The p-series test.
- Using the integral test to bound the error on the n-th partial sum.

§9.4 Positive Series: Other Tests

- The Ordinary Comparison Test.
- The Limit Comparison Test.
- The Ratio Test.
- When each test is appropriate to try and what the hypotheses of the tests are.

§9.5 Alternating Series, Absolute Convergence, and Conditional Convergence

- The Alternating Series test (make sure the hypotheses are satisfied).
- The Absolute Convergence Test.
- The Absolute Ratio Test.
- Conditional Convergence.