MA 241, Spring 2023, Nathan Reading Review: Test 4

This is an overview of the most important skills and understanding I expect you to have developed. I don't promise that every exam problem will match with something on this sheet.

Test 4 will cover Sections 4.1–4.5 of the book and a bit of 4.6.

Exam questions might test your understanding of some of the following important terms and concepts:

sequence	recursively defined sequence	limit of a sequence
convergent sequence	divergent sequence	increasing sequence
decreasing sequence	monotonic sequence	bounded above
bounded below	bounded	series
partial sum	limit (or sum) of a series	convergent series
divergent series	geometric series	telescoping series
harmonic series	<i>p</i> -series	remainder
alternating series	absolutely convergent series	conditionally convergent series
power series	radius of convergence	interval of convergence

The exam might test your ability to carry out some of the following procedures.

• Given a formula (possibly a recursive formula) for a sequence, find some of the first terms.

• Given some terms of a sequence, write a formula for the terms of the sequence.

• Given a sequence, determine whether it converges or diverges. If it converges, you might be asked to find the limit. You might use one or more of the following tools:

Treat the sequence like a function Add/subtract/multiply/divide convergent sequences Squeeze Theorem Monotone Convergence Theorem

• Given a series, find some of the first partial sums.

• Given a series, determine whether the series converges or diverges. If it is convergent, you might be asked to find the sum or approximate the sum. You might be asked to say if the series is absolutely convergent or conditionally convergent. You might use one or more of the following tools:

Test for Divergence Pull out constants, break up addition/subtraction Geometric series The *p*-Series Test Telescoping series The Alternating Series Test The Integral Test The Comparison Test The Limit Comparison Test

The Ratio Test

• Given a repeating decimal, express it as the sum of a geometric series, and find the sum of the series, thus giving an expression for the decimal as a rational number.

• Given a power series, find its radius of convergence. You can always use the Ratio Test for this.

Challenge Problems:

I will ask a few challenge questions at the end of the exam, worth very few points, and these problems are exempt from anything I have told you or will tell you about what I will or will not ask on the test.

Closed book, closed notes, no calculators.