

Math 1830- Review Sheet for 1st Exam

The first exam is Friday Sept. 22 and will cover all of Chapter 1 plus Sections 2.1, 8.1, 8.2 As a good first step make sure you understand all the quiz problems and homework problems! This sheet is designed to help you organize your studying, not to be exhaustive.

Definitions to know:

Functions:

- Domain, range, function, independent, dependent variables, graph
- Increasing, decreasing functions, odd, even functions
- Polynomials, rational functions, root functions, composition of functions

Sequences/Series:

- Formal definition of the limit of a sequence
- Convergence of a series in terms of sequence of partial sums.
- Partial sums, divergent, convergent, infinite series, geometric series, harmonic series
- Monotonic, increasing, decreasing, bounded

Limits/Continuity

- Formal definitions of limit of a function, one-sided limits, limits at infinity and infinite limits.
- Definitions of continuity of $f(x)$ at $x=a$, continuous from right/left
- Types of discontinuities
- Continuous on a closed interval
- Horizontal, vertical asymptotes

Derivatives

- Definition of derivative
- Average vs. instantaneous rate of change
- Slope of tangent line

Theory to Know:

- Limit laws for functions and sequences, understand them and when to apply
- Squeeze theorem (for limits of functions and of sequences).
- Continuity theorems that arise from limit theorems (e.g. 1.5 Thms 4, 5, 6, 8)
- Intermediate value theorem.
- Theorem 8.1 #6
- Monotonic sequence theorem.
- Theorems. 8.2 #6, 7.

Skills you should have:

- Calculate limits of functions given graphs and/or formulas.
- Sketch a graph of a function given specified limits and/or values.
- Formally prove limits exist for linear functions (e.g. p.35 #29-32).
- For other functions, given an ϵ show how to obtain a δ (p. 34 #23-25).
- Determine where a function is continuous and describe its discontinuities given either a graph or formula.
- Apply the intermediate value theorem (for example to show roots must exist).
- Calculate average and instantaneous rates of change and slopes of tangent lines using limits.
- Find horizontal and vertical asymptotes and use them to help sketch graphs.
- Solve homework problems!