Tests in Math 331 have two parts: an in-class part and a take-home part. For the first test, the in-class part will be given on Monday, February 25. The take home part will be handed out on Monday and will be due in class on Friday, February 29.

The take-home part of the test will have questions that are similar in difficulty to questions that have been assigned for homework. For the take-home test, however, you will not be allowed to work together, and you are not allowed to consult any sources other than the textbook and your class notes.

The in-class part of the test will cover everything that we did in class up to and including Wednesday, February 20. This includes all of Chapters 1 and 2 from the textbook, except for part of Section 2.6; from Section 2.6, only the Intermediate Value Theorem is included. You might be asked to do some short, simple proofs on the in-class test. This might include a simple ϵ-δ proof. (My idea of what counts as a short, simple proof is not guaranteed to be the same as yours.) You will certainly be asked to state some theorems and definitions, and you will find some questions that test your understanding of them. There will probably be some computational problems and some short essay questions. There might even be a few true/false questions. Here are some of the things that you should know for the in-class test:

The Fundamental Theorem of Arithmetic

The Heine-Borel Theorem

The Bolzano-Weierstrass Theorem

The Closed Nested Interval Theorem

The Squeeze Theorem

The Intermediate Value Theorem

Irrational numbers

For a prime number, p, $\sqrt{p}$ is irrational

Dedekind cut

The construction of $\mathbb{R}$ as the set of Dedekind cuts of $\mathbb{Q}$

Upper bounds and Least Upper Bounds

The Least Upper Bound Property of $\mathbb{R}$

The Archimedean Property of $\mathbb{R}$

Consequences of the Archimedean property (Eg.: $\mathbb{N}$ is not bounded above)

Density of the rational numbers in $\mathbb{R}$

Fields and ordered fields

The order axioms that define an ordered field

The Trichotomy Axiom for an ordered field

The additive and multiplicative closure of P (where P is the set of "positive" numbers)

The definition of absolute value

The meaning of $|a| \leq b$

The triangle inequality

Indexed family of sets, $\{X_a \mid a \in A\}$

Open cover of a subset of $\mathbb{R}$

Subcover of an open cover

Finite subcovers and open covers that have no finite subcover

Accumulation point of a subset of $\mathbb{R}$

Bounded subset of $\mathbb{R}$

Functions

The domain and range of a function

Composition $f \circ g$ of functions

Limits

The ϵ-δ definition of a limit

Using the ϵ-δ definition of a limit

Geometric meaning of the ϵ-δ definition of a limit

How limits can fail to exist

The Dirichlet function

For a *bounded* function $g(x)$, $\lim_{x \to 0} xg(x) = 0$ (exercise 2.2.2)

Limits of sums, products, and quotients

Limits from the left and from the right

Limits at infinity; the "N-δ" definition

Infinite limits (as in Section 2.4, exercies 10–13)

Continuity

Continutiy on a closed, bounded interval $[a, b]$

Continuity of a composition of continuous functions