Comprehensive Exam Notes

Here we go!

Section 1: Graduate Algebra

Section 2: Real Analysis

WEEK 1/2: Convergence

Learning Goal 1
State and check the definitions of pointwise and uniform convergence for sequences and series of functions.
Learning Goal 2
Apply the Weierstrass M-test.
Learning Goal 3
Prove and use the theorem relating continuity and uniform convergence.
Learning Goal 4
State and check the definition of uniform continuity.

WEEK 4: Fourier Series Part 1

Learning Goal 5
Describe how we derive the formulas for computing the coefficients of the Fourier series.
Learning Goal 6
Compute the Fourier series for simple examples. "Simple" here means that the integrals required to compute the coefficients don't take forever to compute.

WEEK 4: MISSING FOURIER SERIES PART 2

WEEK 8: The Space L^2: Part 1

Learning Goal 7
State the definition of $L_2([a,b])$. Check if a given function is or is not in $L_2([a,b])$.
Learning Goal 8
State and prove the Cauchy-Schwartz inequality and the Minkowski inequality.

WEEK 9: The Space L^2: Part 2

Learning Goal 9
State, check, and use the definition of a norm.
Learning Goal 10
Identify complete normed vector spaces and explain why a space is or is not a complete normed vector space.

WEEK 10: Linear Transformations

Learning Goal 11
State the definition of a bounded linear operator. Use the definition in proofs.

Section 3: Numerical Analysis

Section 4: Complex Analysis

Section 5: Topology

Section 6: Differential Equations