Topics for Geometry/Topology Qualifying Exam

Complex Analysis

Elementary functions, Cauchy-Riemann equations, Cauchy's integral formula (including Cauchy's differentiation formula), power series, singularities, residues, contour integrals.

Suggested books:
- Churchill and Brown, *Complex Variables and Applications*, Chapters 1-7
- Marsden and Hoffman, *Basic Complex Analysis*, Chapters 1-4

Geometry/Topology

Manifolds and submanifolds, inverse and implicit function theorems, mappings and regular values, vector fields, differential forms and integration, orientation, Stokes' theorem, fundamental group, van Kampen theorem, covering spaces, singular homology, Mayer-Vietoris theorems, singular cohomology, de Rham cohomology, and the de Rham theorem.

Suggested books:
- Bredon, *Topology and Geometry*, Chapters 2-5
- Hatcher, *Algebraic Topology*, Chapters 1,2
- Lee, *Introduction to Smooth Manifolds*, 2nd Edition, Chapters 1-5, 8-12, 14-18
- Massey, *Algebraic Topology*, Chapters 2-5, 7, 9
- Munkres, *Algebraic Topology*
- Spivak, *Calculus on Manifolds*.
- Spivak, *Introduction to Differential Geometry*, Vol 1, Chapters 1-8, 11
- Tu, *An Introduction to Manifolds,* Chapters 1-3, 5-7
- Boothby, *An Introduction to Differentiable Manifolds and Riemannian Geometry*