

For the final exam

- **Basics:** n -manifold (with or without boundary), smooth structure, smooth map, tangent space, derivative, Inverse Function Theorem, Local Immersion/Submersion Theorem, submanifold, regular value, Regular Value Theorem, transversality, homotopy and stability, Preimage Theorem, Sard's Theorem, Whitney Embedding Theorem, vector fields, Lie bracket.
- **Intersection theory:** Transversality Theorem (genericity of transversality), orientation, oriented (and mod 2) intersection number, degree, Euler characteristic, Lefschetz numbers, index of vector fields, Poincaré-Hopf Index Theorem.
- **Flows, forms and integration:** Local flows and vector fields, flows, Differential forms, exterior derivative, contraction, Lie derivative, integration, Stokes Theorem.