Chapter 1

The Algebra and Topology of $\mathbb{R}^n$

1.1 Notes

- Syllabus.
    - In his mind, homework is the main setting where learning takes place.
- We're going to be studying analysis, or calculus, on **manifolds** this quarter.
- **Manifold**: A "space" that looks like Euclidean space $\mathbb{R}^n$ locally.
    - The surfaces of a sphere and torus are common examples of 2-dimensional manifolds.
    - With regard to the above definition, think about how people in ancient times didn't think the Earth was a sphere because it looked like a plane locally.
- This class will look much like a calculus course, in that we first talk about limits, then differentiation, then integration, and culminating in the fundamental theory of calculus.
- Last quarter, we primarily developed linear algebra and basic topology on metric spaces.
    - Chapter 1 of Munkres (1991) is a review of what's needed from last quarter.
    - This is all basically continuity.
- Thus, we can start right up with differentiation.