Fall 2016 Notes

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August 27, 2016

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Chapter 1

Some Category Theory

In an effort to help Vinh prepare for his talk, here are some notes I have compiled on category theory. Here are the books and notes that I used: the *CRing project* notes; *A First Course in Commutative Algebra* by Altman and Kleiman; and *Foundations of Algebraic Geometry* by Ravi Vakil.

1.1 Basics

Here are some of the basic ideas (and frankly, the most boring part of category theory).

Chapter 2

Probability

Some (mostly discrete) probability theory for MA 51900.

2.1 Basics

In this section we will talk about concepts related to discrete probability. Before we begin, we have to define the concepts we will be working with throughout the rest of this section (ye this chapter). First and foremost, to do probability we need a *sample space* Ω and a probability function $p\colon \mathscr{P}(\Omega) \to [0,1]$ which assigns values between 0 and 1 to subsets of Ω (usually, one needs to specify a σ-algebra on Ω, but for the rest of the section, since $\operatorname{card}\Omega < \infty$, we need only consider the power set of Ω, $\mathscr{P}(\Omega)$ since its cardinality is also finite).

A large part of discrete probability theory comes down to combinatorics.