Notes: CS109 — Fall 2022 — Stanford

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1 Counting / Combinatorics

1.1 Step Rule of Counting (aka Product Rule of Counting) and Independence

1.2 Sum Rule of Counting and Mutual Exclusivity

1.3 Permutation

$$^nP_k = \frac{n!}{(n-k)!}$$

1.4 Combination

$$\binom{n}{k} = {}^nC_k = \frac{n!}{k!(n-k)!}$$

1.5 Semi-Distinct Objects

1.6 Over Counting

1.7 Derangements

2 Probability

2.1 Defining Probability

2.2 Equally Likely Outcomes

2.3 The choice of Sample Space

Distinct or Indistinct
Ordered or Unordered

2.4 Choice of Sample

2.5 Conditional Probability

2.6 Law of Total Probability

2.7 Bayes Theorem

2.8 Generalized Independence

3 Random Variables and Probability Distributions

3.1 Random Variables