(Non-exhaustive) Learning Objectives

Fall 2021
Exam 1 of 2

Section 2.1

- Enumerate outcomes of a random experiment
- Identify events as combinations of outcomes in the sample space
- Manipulate sets using unions, intersections, complements
- Apply these concepts to solve word problems about random experiments

Section 2.2

- Recall and apply the axioms of probability
- Compute unknown probabilities in an event space using known probabilities in that event space
- Derive and apply useful relationships among probabilities of outcomes and events

Section 2.3

- Compute probabilities of events in experiments that have equally probable finite number of outcomes (by applying combinatorics and permutations).

Section 2.4

- Compute conditional probabilities
- Apply Bayes Rule and the Theorem of total probability
- Apply concepts of conditional probability, Bayes Rule, and the theorem of total probability to solve word problems

Section 2.5

- Identify when events are statistically independent

Section 2.6

- Apply tree diagrams to solve small sequential experiment word problems and word problems with conditional probability

Section 3.1

- Define a random variable in terms of its sample space and the mapping from the sample space of a random experiment to X.

Section 3.2: For a discrete random variable,

- Define the probability mass function (pmf) of a RV in a random experiment using knowledge of the sample space and its probability space
- Solve probability problems using a pmf
- Apply the properties of a pmf

Section 3.3: For a discrete random variable,

- Compute $E(X)$, $E(X^n)$ and VAR(X), STD(X).
- Compute $E(g(X))$, the expected value of a function of a random variable.
- Apply properties of Expectations and Variances

Section 4.1

- Compute the cumulative distribution function of a general random variable, including a continuous RV, a mixed RV, and a discrete RV.
- Solve probability problems using a cdf
- Apply the properties of a cdf

Section 4.2: For a general random variable,

- Compute a pdf from a cdf, and a cdf from a pdf
- Solve probability problems using a pdf
- Apply the properties of a pdf
  (Note: Section 4.2.2 also covers conditional cdf's and conditional pdf's. We haven't covered this yet.)

Section 4.3: For a general random variable,

- Compute $E(X)$, $E(X^n)$ and VAR(X), STD(X).
- Compute $E(g(X))$, the expected value of a function of a random variable.
- Apply properties of Expectations and Variances