Topics for Exam 2

1. **Random Variables**
   - 1.1. Continuous and discrete random variables
   - 1.2. Cumulative distribution function (cdf)
   - 1.3. Probability density function (pdf) and probability mass function (pmf)
2. **Examples of Random Variables**
   - 2.1. Discrete random variables: Bernoulli, Binomial, Geometric and Hypergeometric
   - 2.2. Continuous random variables: Uniform and Exponential
3. **Expectations of Random Variables**
   - 3.1. Expected Value a random variable
   - 3.2. Expected value of functions of random variables
   - 3.3. Moments, variance and and moment generating function (mgf)
   - 3.4. Uniqueness Theorem for Moment Generating Functions

Relevant Sections in Lecture Notes: 4.1, 4.2, 5.1, 5.2 and 5.3

Relevant sections in the Text: 3.1, 3.2, 4.1, 4.2, 4.3, 4.4 and 5.2

Relevant assignments: 4, 5, 6 and 7.

Important Concepts

Random variable, continuous and discrete random variables, cumulative distribution function (cdf), probability mass function (pmf), and probability density function (pdf), Expectation, moments, moment generating function, variance, joint distributions, marginal distributions, independent random variables, covariance and correlation.

Important Skills

1. Know how to compute the cdf and the pdf (or pmf) of a random variable.
2. Know how to compute expectations, moments, variance and moment generating functions.
3. Know how to use moment generating functions and know how to apply the uniqueness theorem for moment generating functions.