

**Topics for Exam 2****1. Expectations of Random Variables**

- 1.1. Expected Value a random variable
- 1.2. Expected value of functions of random variables
- 1.3. Moments, variance and and moment generating function
- 1.4. Uniqueness Theorem for Moment Generating Functions

**2. Joint Distributions**

- 2.1. Joint distribution of two random variables
- 2.2. Marginal distributions
- 2.3. Independent random variables
- 2.4. Covariance and correlation

**3. Special Random Variables**

- 3.1. Discrete random variables: Uniform Discrete, Bernoulli, Binomial, Geometric, Hypergeometric, Poisson.
- 3.2. Continuous random variables: Uniform, Exponential, Normal, Chi-Square

Relevant Sections in the Lecture Notes: 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1 and 6.2.

Relevant sections in the text: 3.4, 3.5, 3.7, 3.8, 3.9, 4.1, 4.2, 4.3, 4.4, 4.6, 5.2, 5.3, 5.4 and 5.6.

Relevant assignments: 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 18.

**Important Concepts**

Expectation, moments, moment generating function, variance, joint distributions, marginal distributions, independent random variables, covariance and correlation.

**Important Skills**

Know how to compute expectations, moments, variance and moment generating functions; know how to apply the uniqueness theorem for moment generating functions; know how to compute the joint cdf and the joint pdf (or pmf) of two random variables; know how to compute marginal distributions; know how to compute probabilities based on joint distributions; know how to use independence.