Topics for Exam 3

1. **Moment Generating Functions**

    1.1. Definition of the moment generating function (mgf) of a random variable

    1.2. Properties of the moment generating functions

    1.3. 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

3. **Limiting Distributions**

    3.1. The Poisson distribution as a limit of binomial distributions.

    3.2. Convergence in distribution

    3.3. The mgf Convergence Theorem

    3.4. The Central Limit Theorem

Relevant Sections in Lecture Notes: 5.3, 6.1, 6.2, 6.3, 7.1, 7.2, 8.1, 8.2 and 8.3

Relevant sections in the Text: 3.4, 3.5, 3.7, 3.9, 5.4, 5.6, 6.3 and 6.4

Relevant assignments: 13,14,15, 16 and 17.

Important Concepts

Moment generating function (mgf) of a random variable; joint distributions; marginal distributions; independent random variables; independent, identically distributed (iid) random variables; convergence in distribution; the mgf convergence theorem; the central limit theorem.

Important Skills

1. Know how to compute moment generating functions of random variables.
2. Know how to use the mgf of a random variable to compute its moments.
3. Know how to apply the uniqueness theorem for moment generating functions.
4. know how to compute the joint cdf and the joint pdf (or pmf) of two random variables.
5. Know how to compute marginal distributions.
6. Know how to compute probabilities based on joint distributions.
7. Know how to use independence.
8. Know how to apply the mgf convergence theorem to compute limiting distributions.
9. Know how to apply the Central Limit Theorem.