Statistics - 134 (Lecture - 2), Fall 2002

Syllabus for the Midterm

NOTE : The exam will be of 50 minutes. The focus will only be on problem solving and not writing Mathematical proofs.

1. Chapter-1 :

   (a) Section 1.1 : Random experiments, outcomes, equally likely outcome, odds ratio, fair odds.

   (b) Section 1.2 : Interpretation of probability, frequency interpretation, subjective view point.

   (c) Section 1.3 : Mathematical set up for probability, sample space, events, probability function, rules of probability, distributions. [pp 19 - 27].

   (d) Section 1.4 : Conditional probabilities, multiplication rule, rule of average for conditional probabilities, independence of two events, tree diagram representation.

   (e) Section 1.5 : Bayes' rule.

   (f) Section 1.6 : Many events, general multiplication rule, independence of many events, pairwise independence.

2. Chapter-2 :

   (a) Section 2.1 : Success-failure experiment, repeated trials, Binomial distribution, mode of Binomial, mean and standard deviation.

   (b) Section 2.2 : Normal approximation to Binomial probabilities, De Moivre - Laplace Central Limit Theorem, continuity correction. [pp 93 - 100]

   (c) Section 2.4 : Poisson approximation to Binomial probabilities, Poisson distribution.

   (d) Section 2.5 : Sampling with and without replacement, Hypergeometric distribution.

3. Chapter-3 :

   (a) Section 3.1 : Random variables, definition, discrete random variables, examples, Bernoulli(p), Binomial(n, p), Hypergeometric($n; N, G$), Geometric(p), Poisson(λ), Uniform on $\{1, 2, \ldots, n\}$ etc. Distribution of a random variable. Joint distribution of two and many random variables, marginal distributions, independence. Indicator variable, calculus of indicators. Multinomial distribution.

   (b) Section 3.2 : Expectation of a discrete random variable, examples, interpretation. Sum rule. Indicator method, expectation of a function, expectation of square. Independence and product rule. [NOTE : NO Markov Inequality.]

   (c) Section 3.3 : Expectation of a square, examples, definition of variance, standard deviation. Sum formula for independent random variables. Shifting and scaling, standardization. [pp 185 - 190]

   (d) Section 3.4 : Geometric distribution, mean, variance, memory-less property.

   (e) Section 3.5 : Poisson distribution, definition, mean, variance. [pp 222 - 223]

   (f) Section 3.6 : Hypergeometric distribution, sampling without replacement, mean of Hypergeometric. [NO Symmetry]