Final Exam Topic List for STA 4321/5325

Know the Complement Law, the Additive Law and the Multiplicative Law of Probability?

What is the definition of a conditional probability? What do we mean by independent events? What is the difference between mutually exclusive and independent events? What is the multiplicative law under independence?

Know the probability function, mean and variance of the Binomial and Poisson distributions. Know the nature of the geometric and hypergeometric distributions.

What is the definition of a distribution function? What are the properties of a distribution function.

What are the fundamental characteristics of a normal random variable? How can we use a standard normal table to evaluate probabilities for any normal distribution? Be able to perform these evaluations.

Know the density for a gamma and an exponential random variable and the properties of the gamma function. Know the density of a beta random variable?

Know the moment generating functions for binomial, Poisson, normal and gamma distributions.

Know how to form marginal and conditional densities (or probability functions)? What do we mean by independence between two random variables? What is the joint density when two random variables are independent and have the same distribution? What is the covariance of two random variables? Learn the results of theorems 5.9 and 5.12 (parts a and b).

What are the characteristics of a multinomial random variable?

What is a conditional expected value? How are conditional expected values and conditional variances used to find the expected value and variance of a random variable (Theorems 5.14, 5.15)?

Know the steps in the distribution function method for deriving the distribution of a function of random variables. Be able to perform these steps.

Know the steps and be able to do the method of transformations. Know the mean, variance and density of a linear function of a random variable?

What is the moment generating function method? Be able to apply it and to use the special results for sums. Learn the special relationships among random variable families that we have proved with the moment generating function method.

What are the order statistics of a random sample from a distribution? What is the distribution of the max (the min) of a sample?

What does it mean for a sequence of random variables to converge in probability? Why does the sample mean converge in probability to the population mean (weak law of large numbers)?

What does it mean for a random variable to converge in distribution? What does the Central Limit Theorem say? Be able to apply the CLT.