

Things to know for Test 2, Sec. 3.3-4.3

- Know what a distribution function is and how to compute and graph it for discrete and continuous random variables.
- Be able to derive the p.f. or p.d.f. of a random variable from the distribution function.
- Know what quantiles and percentiles of random variables are and how to compute them.
- Know how to derive the quantile function of a continuous random variable.
- Know how to calculate probabilities from joint p.d.f.'s and p.f.'s, e.g. $P(X > Y)$.
- Know how to calculate marginal distributions from joint distributions(don't forget the support!)
- Know how to calculate conditional distribution from joint distribution and the joint distribution from a conditional distribution and marginal distribution (don't forget the support!).
- Know the definition of independence of two random variables and how to determine whether two random variables are independent from the joint p.d.f or p.f. (don't forget the role of the support).
- Know that separate functions of independent random variables are also independent.
- Know Bayes' Theorem and the Law of Total Probability for random variables and how to use them.
- Know how to calculate the p.f. of a function of a discrete random variable.
- Know how to calculate the p.d.f. of a function of a continuous random variable both using the distribution function and directly (don't forget the support!).
- Know what the probability integral transformation is and how to use the inverse probability integral transformation to transform a uniform(0,1) random variable into another distribution.
- Know how to calculate the p.d.f. of a function of two continuous random variables directly using the Jacobian.
- Know what order statistics are and how to calculate the d.f. (and p.d.f.) of an order statistic.
- Know how to calculate the expected value of a random variable, the expected value of a function of a random variable, and the expected value of a function of two or more random variables.
- Know the properties of the expectation operation: for linear functions of random variables, for products of random variables.
- Know the definition of the variance of a random variable and how to calculate it.
- Know the properties of variance: for a linear function of a random variable, for a linear function of independent random variables.
- Be able to work with expectation to prove properties of the variance such as #4,5,6 on p. 203.