10-2-03 - Topic Coverage for Exam I, Ma4261.

- multivariate calculations for general random variables - review of multiple integration
  - marginals, conditionals, independence
  - covariance, correlation
  - mgfs
  - best mean square prediction
- special distributions
  - binomial, multinomial, negative binomial
  - Poisson rvs and Poisson process
  - gamma (exponential and chi square too)
    * waiting times
    * squares of standard normals
  - the bivariate normal, prediction intervals
- transformations and sampling theory
  - direct calculation for discrete and continuous random variables
  - the transformation method for continuous random variables
    * Box-Muller
    * Student's (Gossett's) t- distribution definition and pdf
  - the mgf method
    * $\frac{\sqrt{n}(\bar{X}-\mu)}{\sigma} \sim N(0,1)$ if $X_1, \ldots, X_n$ are iid $N(\mu, \sigma^2)$
    * $\frac{(n-1)S^2}{\sigma^2} \sim \chi^2_{n-1}$.
    * $\frac{\sqrt{n}(\bar{X}-\mu)}{s} \sim t_{n-1}$ for a random sample from a normal population
  - application to confidence intervals
    * for the mean of a normal
    * for the variance of a normal