Review for Midterm 2

Second Midterm: Nov. 1. Extra office hour: Monday, 10:00:00-11:30am, PHSC 1006.

Continuous random variables (Section 5.7).

Gamma-Type distribution and probability density function: Concept and computation. Need to know integration by parts.

Exercise 1. Let Y be a random variable with PDF $f(y) = cye^{-y}$ for $y \in [0, \infty)$, and $f(y) = 0$ for $y \leq 0$. Find c and the expected value for Y.

Bivariate probability distributions and sampling distributions (Chapter 6 except Section 6.8).

Bivariate probability distributions for discrete/continuous Random Variables: Bivariate probability distributions, unconditional (marginal) probability distributions and conditional (marginal) probability distributions.

Exercise 2. Let X and Y be two continuous random variables with joint probability density function $f(x, y) = ce^{-(x+2y)}$ if $0 \leq x < \infty$ and $0 \leq y < \infty$; and $f(x, y) = 0$ for other (x, y). Find

(a). The value of c.

(b). The marginal density for X.

(c). The conditional density functions $f_1(x|y)$ and $f_2(y|x)$.

Exercise 3. Let X and Y be two continuous random variables with joint probability density function $f(x, y) = c(x + y)$ when $0 \leq x \leq 1$ and $0 \leq y \leq x$; and $f(x, y) = 0$ for other (x, y). Find c. Are X and Y independent?

Probability distributions and Expected values for functions of Random Variables: Linear combination of Random Variables, Other function of random variables.

Exercise 4 Let χ^2 be a Chi-square distribution with 2 degree of freedom. Can you find the density function for random variable $W = (\chi^2)^2$?

Exercise 5 Suppose Y_1 and Y_2 are random variables with $(\mu_1 = 0,\ \sigma_1^2 = 2)$, $(\mu_1 = 2,\ \sigma_1^2 = 1)$ and $Cov(Y_1, Y_2) = -1$. Find the mean and variance for

$$L = 3Y_1 - 2Y_2.$$

Estimation using confidence intervals (Chapter 7, section 7.1)

Point estimators: Point estimators, bias function.

Exercise 6 Suppose Y_1 and Y_2 are random sample from an exponential distribution with mean β. Consider two estimators of β:

$$\hat{\beta}_1 = \frac{y_1 + y_2}{2}, \qquad \hat{\beta}_2 = y_1.$$

(a). Are they biased?

(b). What are their variances? Which one has the smaller variance?

WARNING: YOU ARE RESPONSIBLE FOR CHECKING OUT MY TYPOS!

Comments and question to: mzhu@math.ou.edu