MATH 4200 – Homework #5

Due Date: Thursday, March 12st, at the beginning of the lecture

Instructions

Please include the following information on the first page of your completed homework.

1. Your name
2. MATH 4200
3. Homework #5
4. List of students you worked with (if applicable)

Please remember to show your work and explain your answers as necessary. Answers that are not supported by reasoning will not receive full credit. Homework should be stapled if it is longer than one page.

Section 8.8 Problems: #80, #82, #90

Section 8.9 Problems: #97, #98, #102

(*Additional Exercise*) Suppose that independent samples of sizes n_1 and n_2 are taken from two normally distributed populations with variance σ_1^2 and σ_2^2, respectively. If S_1^2 and S_2^2 denote the respective sample variances, Theorem 7.3 implies that $(n_1-1)S_1^2/\sigma_1^2 \sim \chi^2(n_1-1)$ and $(n_2-1)S_2^2/\sigma_2^2 \sim \chi^2(n_2-1)$. Furthermore, these χ^2 random variables are independent because the samples were independently taken.

(a) Use these quantities to construct a random variable that has an F distribution with (n_1-1) numerator degree of freedom and (n_2-1) denominator degrees of freedom.

(b) Use the F-distribution quantity from part (a) as a pivotal quantity, and derive a formula for a $(1-\alpha)100\%$ confidence interval for σ_2^2/σ_1^2

Section 9.2 Problems:

#2, #3, #5, #7