

Math 466/566 - Homework 3

1. We defined the chi-squared distribution as follows. Let Z_1, Z_2, \dots, Z_n be independent standard normal RV's. Let

$$X = \sum_{i=1}^n Z_i^2 \quad (1)$$

Then X has the chi-squared distribution with n degrees of freedom. Recall that you computed the distribution of a single Z_i^2 in the first homework. Use this to show that the distribution of one Z_i is a gamma distribution with a suitable choice of α and β and then show that the chi-squared distribution is the gamma distribution with $\alpha = n/2$ and $\beta = 1/2$.

2. Problem 4 in chapter 3 in the book.

3. (This problem is very close to problem 1 in chapter 3 in the book.) Data set 3.1 has a sample of 25 which is drawn from a population with unknown mean μ and variance σ^2 . The population consists of stars and the measurements are indices of brightness in a certain frequency range. Estimate μ and σ . Give a 95% confidence interval for the estimate of μ .

4. (This problem is very close to problem 2 in chapter 3 in the book.) The people in a population are classified into those that have knowledge of some public health issue and those that do not. p is the proportion of the population that has knowledge of the public health issue. Data set 3.2 has a sample of 900 people. A 1 indicates they have knowledge of the issue, a 0 that they do not. Estimate p with a 90% confidence interval.

5. Problem 2 in chapter 4 in the book. **Note: Be sure to read the instructions that appear at the very beginning of section 4.10.**

6. Problem 3 in chapter 4 in the book.

7. Problem 4 in chapter 4 in the book.