MAT 271E – Homework 8

Due 04.05.2011

1. We are given independent, identically distributed (iid) observations $X_1, X_2, \ldots, X_n$ which have Gaussian distributions with mean 3, and unknown variance v.

   (a) Find the maximum likelihood estimate of v.

   (b) Is the estimate you found biased? If it is biased, can you propose an unbiased estimator?

   (c) Is the estimate you found in part (a) consistent?

2. We are given independent, identically distributed (iid) observations $X_1, X_2, \ldots, X_n$ which are uniformly distributed on the interval $[0, \theta]$.

   (a) Find the maximum likelihood estimate of θ.

   (b) Is the estimate you found biased? If it is biased, can you propose an unbiased estimator?

   (c) Is the estimate you found in part (a) consistent?

3. Consider a biased die where the probability of observing a '1' is equal to θ. Let k be a fixed number. You roll the die until you observe k 1's. Let N be the number of rolls. Assuming that the rolls are independent, find the ML estimator of θ based on N.