Statistics 3858b Suggested Problems

January 11, 2017

1. Verify that the parameters are identifiable in the following cases.

   (a) pareto (see page 323)

   (b) Uniform $(0, \theta)$, $\theta \in \Theta = R^+$.

   (c) Geometric, p, where $p \in \Theta = (0, 1)$. You can do this for either form of the geometric.

   (d) Bivariate normal.

2. Consider data $X_i, i = 1, \ldots, n$ iid with cdf F. Consider the empirical distribution function F_n of these r.v.s. For a fixed value of x verify that the Law of Large Numbers (LLN) applies and so can be used to show $F_n(x) \to F(x)$ in probability as $n \to \infty$.

3. Suppose that $X_i, i = 1, \ldots, n$ are iid exponential, parameter λ. Notice that $\mathrm{E(X_i)} = \frac{1}{\lambda}$.

   Consider the r.v. $\hat{\lambda}_n = \frac{1}{\bar{X}}$.

   Find $\mathrm{E}(\hat{\lambda}_\mathrm{n})$ and $\mathrm{Var}(\hat{\lambda}_\mathrm{n})$ (you will need $n > 2$).

   Is $\hat{\lambda}_n$ a biased or unbiased estimator of λ?