HOMEWORK 2

STA701.01, Statistical Inference
Fall Semester, 2013

Due: Thurs Sept 19th, 2013

1 The Pareto distribution has density function:

$$f(x|x_0, \theta) = \theta x_0^{\theta} x^{-\theta-1}$$

if $x \geq x_0$ and $\theta > 1$. Assume that $x_0 > 0$ is given and that $X_1, X_2, \ldots, X_n$ is an i.i.d. sample. Find a sufficient statistic for θ by (a) using factorization theorem, and (b) using the property of exponential family. Are they the same? If not, why are both of them sucient?

2 Let $X_1, X_2, \ldots, X_n$ are sampled from the Gaussian distribution with μ and σ. Suppose μ is known and σ is not known. Find the minimal sufficient statistics.

3 Prove that whenever $\hat{\theta}$ is unbiased, then $\mathbb{E}(\hat{\theta}|T)$, where T is a sufficient statistics for θ, is unbiased.

4 Prove that Rao-Blackwell's theorem. Show every step clearly.