AMS-205B WINTER 2016
HOMEWORK 3

All problems refer to Casella & Berger, Statistical Inference, Second Edition, Duxbury.

(1) Problem 7.12.
(2) Problem 7.14.
(3) Problem 7.19 + 7.20 + 7.21.
(4) Problem 7.37.
(5) Problem 7.40.
(6) Problem 7.42.
(7) Problem 7.46.
(8) Problem 7.50.
(9) Let $X \sim \mathsf{Poi}(\theta)$, with $\theta > 0$. Consider using $\tilde{\eta} = (-1)^X$ as an estimator for $\eta = \exp\{-2\theta\}$. Show that $\tilde{\eta}$ is the MVUE for η. Compare this estimator against the MLE for this problem. Which one would you prefer in practice? Why?
(10) Let a random sample of size n be taken from an exponential distribution with expectation equal to θ. Find the MVUE of $P(X \leq 2)$.
(11) Problem 10.1.
(12) Let $X_1, \ldots, X_n$ be a random sample sample from a Pareto distribution with density

$$f(x \mid \alpha, \beta) = \begin{cases} \frac{\alpha\beta^\alpha}{x^{\alpha+1}} & x \geq \beta \\ 0 & \text{otherwise.} \end{cases}$$

Find the maximum likelihood estimator of (α, β). Is this MLE unbiased? Is it consistent?
(13) Let $X_1, \ldots, X_n$ be a random sample sample from a density

$$f(x \mid \alpha, \beta) = \begin{cases} \exp\{-(x-\mu)\} & x \geq \mu \\ 0 & \text{otherwise} \end{cases}.$$

Find the maximum likelihood and the method of moments estimator for μ. Are these estimators unbiased? Are they consistent? Are they assymptotically efficient? What is their relative efficiency?