HOME ASSIGNMENT 6 (18.05, SPRING 2007)

Read: *Dekking et al.* Chapter 19, 20, and 21.

Solve: Problems 19.5, 19.7, 20.4, 20.5, 20.6, 20.7, 20.9 **a** and **b**, 21.2, 21.6, 21.9, 21.14. Also, solve these (10 points each).

A. Let $X_1, \dots, X_n$ be random sample from $U(0, b)$. Prove or disprove: for all $n \geq 2$
i) $Med(X_1, \dots, X_n)$ is an unbiased estimator for $b/2$;
ii) $IQR(X_1, \dots, X_n)$ is an unbiased estimator for $b/2$.

B. Let $X_1, \dots, X_n$ be random sample from $U(0, b)$. Find an unbiased estimator for $(b+1)^2$.

C. Let $X_1, \dots, X_n$ be random sample from $Exp(\lambda)$. Find an unbiased estimator for λ. Same for λ^2. (Hint: use the same idea as for unbiased estimator for p in $Geo(p)$.)

D. Let $X_1, \dots, X_n$ be random sample from $U(-a, a)$. Clearly, the mean $\mu = 0$. The unbiased estimator $\overline{X}_n$ for μ is almost surely $\neq 0$. Can you explain that? What is the most efficient estimator for μ in this case?

E. Let T_1 and T_2 two unbiased estimators for parameter θ. Prove that $T = \max(T_1, T_2)/2 + \min(T_1, T_2)/2$ is also unbiased. Is it possible that T is less efficient than at least one of the T_1, T_2? Is it possible that T is less efficient than both T_1 and T_2?

Please also do 20.8 and 21.8 for yourself (these will not be graded).

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This Homework is due Wednesday April 11 at 2 pm. in 2-108 (UMO)