IEOR 165
SPRING 2004
Mid Term Exam
(March 18, 2004)

Answer Both Questions:

Q1: Population X has a density function $f(x) = \exp\{-(x-b)\}$, $x > b$. Suppose we have a random sample $X_1, X_2,\ldots, X_n$ of size n.

(1) Develop an estimator B_{MOM} for 'b' using the method of moments.
(2) Find the mean and variance of the above estimator. Is this an unbiased estimator? Otherwise find a constant c such that $B_{MOM:C} = B_{MOM} + c$, is an unbiased estimator
(3) Obtain the Maximum Likelihood estimator B_{MLE} of 'b'.
(4) Find the mean and variance of the maximum likelihood estimator. Is this unbiased. Otherwise find a constant c such that $B_{MLE:C} = B_{MLE} + c$, is an unbiased estimator.
(5) Which of these four estimators is the best (or the one you would recommend). Explain why?

Q2. Uniform Waxed Bags (UWB) manufacturer produces waxed paper bags. UWB claims that the wax thickness on the inside and outside of the waxed paper bags have the same mean and variance. A sample of 25 observations of the amount of wax on each side of the paper bag is obtained and the following statistics are recorded.

	Inside	Outside
Sample mean	1.846	1.742
Sample Variance	0.018	0.021

(1) Test at 99% significance level, the hypothesis that the mean inside and outside thickness are equal, assuming that the inside and outside thickness have normal distributions with equal variances.
(2) Test at 99% significance level, the hypothesis that the inside and outside thickness have the same variances.
(3) Based on the conclusion you have for part (2) do you consider your test in part (1) valid? If not, carry out a more appropriate test.

HAVE A HAPPY SPRING BREAK!!!