1. Let $X_1, X_2, \ldots, X_n$ constitute a random sample from a uniform population with $\alpha = 0$. Find an unbiased estimator of β based on the smallest sample value, (i.e. the first order statistic, Y_1).

2. Show that $\overline{X}^2$ is an asymptotically unbiased estimator of μ^2.

3. Suppose X is a random variable with the binomial distribution with parameters p and n.

   (a) Show that $\dfrac{X+1}{n+2}$ is a biased estimator of the parameter p. Is this estimator asymptotically unbiased?

   (b) Show that $X\left(1 - \dfrac{X}{n}\right)$ is a biased estimator of the variance of X. Is this estimator asymptotically unbiased?