高级计量经济学
Assignment 3

1. Let $x_1, x_2, \ldots, x_n$ be i.i.d. random observations of random variable x with $E[x] = \mu$. Which of the following estimators of μ are unbiased? Which are consistent?

   (1) $\hat{\mu}_1 = \dfrac{1}{n+1} \sum_{i=1}^{n} x_i$

   (2) $\hat{\mu}_2 = \dfrac{1.01}{n} \sum_{i=1}^{n} x_i$

   (3) $\hat{\mu}_3 = 0.01 x_1 + \dfrac{0.99}{n-1} \sum_{i=2}^{n} x_i$

2. Let $s^2 = \dfrac{\mathbf{e}'\mathbf{e}}{n-k}$ where $\mathbf{e}$ is the OLS residual vector of the linear regression model, n is the number of observations, and k is the number of variables in $\mathbf{X}$.

   Prove that $E[s^2 \mid \mathbf{X}] = \sigma^2$ under assumptions A.1 — A.4.