

SMF PROBLEMS 1. 9.5.2012

Q1. In a normal model $N(\mu, \sigma^2)$, show that \bar{X} is efficient for μ .

Q2. In $N(\mu, \sigma^2)$ with μ known, show that $\frac{1}{n} \sum_1^n (X_i - \mu)^2$ is efficient for $v := \sigma^2$.

Q3. In $N(\mu, \sigma^2)$ with σ the parameter of interest but μ unknown, show that the unbiased sample variance

$$S_u^2 := \frac{1}{n-1} \sum_1^n (X_i - \bar{X})^2$$

is asymptotically efficient for $v := \sigma^2$, with efficiency $1 - 1/n \rightarrow 1$.

Q4. Show that with $t(n)$ the Student t -distribution with n degrees of freedom (df), $t(n) \rightarrow N(0, 1)$ as $n \rightarrow \infty$.

NHB