HOMEWORK 4

STA701.01, Statistical Inference
Fall Semester, 2013

Due: Tues Oct 1st, 2013

1 If we have a finite $\mathcal{S}$, then show that a minimax rule always exists.

2 Let $X_i, \ldots, X_n \sim N(\mu, \sigma^2)$. Show that $\bar{X}$ and s^2 are unbias estimators for μ and σ^2, respectively.

3 Let $X_i, \ldots, X_n \sim$ Bernoulli(p). Let $Y = \sum_{i=1}^{n} X_i$. Let $\hat{p}_1 = Y/n$ and $\hat{p}_2 = (Y + \alpha)/(\alpha + \beta + n)$ where $\alpha = \beta = \sqrt{n/4}$. Consider the squared error loss and risks

$$R(p, \hat{p}_1) = \frac{p(1-p)}{n}$$

and

$$R(p, \hat{p}_2) = \frac{n}{4(n + \sqrt{n})^2}.$$

Plot $R(p, \hat{p}_1)$ and $R(p, \hat{p}_2)$. What can you say about them?