

1. A sample $X_1, \dots, X_n \sim f(x|\theta)$ is taken from a distribution with a finite variance and expectation θ . θ is estimated by the sample mean $\delta(X) = \bar{X}$. The loss function has form

$$L(\theta, a) = \phi(\theta)(\theta - a)^2$$

where $\phi(\theta)$ is some function. Prove that for any θ the risk of the decision rule $\delta(X)$ tends to zero as $n \rightarrow \infty$.

2. The following is the loss matrix of a particular no-data problem

	a_1	a_2	a_3	a_4	a_5
θ_1	1	0	2	1	-1
θ_2	3	5	4	7	0
θ_3	-2	-3	-2	-1	1

a) Which decisions (actions) are admissible and which are inadmissible?

b) θ has the following prior distribution

$$\pi(\theta_1) = \frac{1}{2}, \quad \pi(\theta_2) = \frac{1}{4}, \quad \pi(\theta_3) = \frac{1}{4}.$$

Find the Bayesian expected loss of each decision.

c) Find the Bayes decision of this no-data problem.