

Answer the Following Questions

1. Let X_1, \dots, X_n is a random sample from $N(\mu, \sigma^2)$ where μ and σ^2 are unknown. Find the likelihood ratio test of size α for

$$H_0 : \sigma = \sigma_0 \quad VS \quad H_1 : \sigma \neq \sigma_0$$

2. is a random sample from $N(\theta_2, \theta_3)$ where the two random samples are independent. Find the like likelihood ratio test of size α for the hypotheses
3. Find the Bayes estimates of the unknown parameters of the following distributions based on random sample of size n and mean squared error loss functions.

distribution	Unknown parameters	Prior distributio n	Known parameters
Bernoulli (θ)	θ	Beta(a,b)	a, b
Binomial (m, θ)	θ	Beta(a,b)	m, a, b
$N(\theta, \sigma_1^2)$	θ	$N(\mu, \sigma_2^2)$	$\mu, \sigma_1^2, \sigma_2^2$

4. Construct the Bayesian 95% confidence intervals for θ in question (3).
5. use the information in question (3) to perform the Bayesian tests for

$$H_0 : \theta \leq \theta_0 \quad VS \quad H_1 : \theta > \theta_0 .$$