

INDIAN STATISTICAL INSTITUTE, BANGALORE CENTRE
B.MATH - Third Year, Second Semester, 2002-03
Statistics - IV, Backpaper Examination

(10) 1. Consider an $I \times J$ contingency table where the rows ($1 \leq i \leq I$) are independent samples. Let m_{ij} be the expected count of the (i, j) cell whose probability is p_{ij} . Prove that

$$\log(m_{ij}) = u + u_{1(i)} + u_{2(j)}, \forall i, j, \text{ if and only if}$$

$$p_{1j} = p_{2j} = \dots = p_{Ij}, j = 1, 2, \dots, J.$$

(10) 2. What is the difference between

- (i) fitting a normal model for a given data set, and
- (ii) fitting a model for the same data set after obtaining the kernel density estimate using a Gaussian kernel?

(10) 3. Let X be $N(\theta, 1)$, where $\theta < 0$. Consider the decision problem where the loss function is $L(\theta, a) = (\theta - a)^2$. Consider the two decision rules, $\delta_1(X) = X$ and $\delta_2(X) = X^- = \min\{X, 0\}$. Show that δ_2 has a uniformly smaller risk than δ_1 for all $\theta < 0$.

(10) 4. Find the minimax strategy for the two-person, zero-sum game with the following loss matrix:

	a_1	a_2	a_3	a_4
θ_1	3	1	0	2
θ_2	0	2.5	3	1

(10) 5. Two expert wine tasters provided the following rankings for each of the 12 different bottles of burgundy wine.

wine	1	2	3	4	5	6	7	8	9	10	11	12
Judge 1	10	8	4	11	2	5	3	12	1	9	7	6
Judge 2	7	9	2	8	3	6	10	12	4	11	5	1

Are parametric methods suitable to investigate the difference between the two rankings? What are the different approaches available for investigating this problem? Explain the procedures; there is no need to analyze the data.