

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – STATISTICS

FIRST SEMESTER – NOVEMBER 2009

ST 1817 - STATISTICAL COMPUTING - I

Date & Time: 13/11/2009 / 1:00 - 4:00 Dept. No.

Max. : 100 Marks

Answer any **THREE** questions. All questions carry equal marks.

1 a). Fit a mixture of two normal distributions with mixing proportion as 1/2 and 1/2.

Age	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100
No. of workers	3	21	150	335	326	135	26	4

Also test the goodness of fit at 5% level of significance.

b). Mails were received in an office on each of 100 days. Assuming the following data to form a random sample from a Poisson distribution, find the expected frequencies and test the goodness of fit at 5% level of significant.

No. of letters	0	1	2	3	4	5	6	7	8	9	10
Frequency	1	4	15	22	21	20	8	6	2	0	1

(18 +15)

2 a) The following data relates to the number of accidents to 650 women working on highly explosive shells during 5 week period.

No of accidents	0	1	2	3	4	5
Frequency	450	132	41	22	3	2

Fit a Negative Binomial distribution for the above data and test the goodness of fit.

b) The following date represents the exports of leather finished products from US. Fit a logistic curve by Yule's method . Also obtain the trend values. (given k= 152)

Peroid (t)	5	18	25	35	46	50	54	60	66	70
Exports (in million \$)	67	114	131	144	150	151	151	152	153	154

(15+18)

3a) Find the inverse of the given matrix using Cayley Hamilton theorem

$$\begin{pmatrix} 3 & 1 & 1 \\ 1 & 5 & 1 \\ 1 & 1 & 3 \end{pmatrix}$$

b) Verify whether the following are linearly independent or not.

$$\begin{pmatrix} 4 \\ 3 \\ 2 \\ 1 \end{pmatrix} \quad \begin{pmatrix} 3 \\ 2 \\ 1 \\ 1 \end{pmatrix} \quad \begin{pmatrix} 7 \\ 8 \\ 2 \\ 1 \end{pmatrix} \quad \begin{pmatrix} 6 \\ 3 \\ 2 \\ 5 \end{pmatrix}$$

c) Generate a sample of size 5 from Cauchy population with scale parameter 2 and location parameter 1 (Given $F(x) = R = 0.266, 0.567, 0.46, 0.294, 0.548$). (12 + 12 + 9)

4. (a) Generate a sample of size 3 from bivariate normal distribution, $N_2 \left[\begin{pmatrix} 10 \\ 20 \end{pmatrix} \begin{pmatrix} 6 & -3 \\ -3 & 5 \end{pmatrix} \right]$.
(given $F(x) = R = 0.557, 0.467, 0.738$)

(b) Find the rank of the matrix $\begin{bmatrix} 3 & 2 & 3 & 1 \\ 4 & 3 & 5 & 2 \\ 2 & 1 & 1 & 0 \end{bmatrix}$

(c). Verify whether or not the following matrix is positive definite:

$$\begin{pmatrix} 2 & 7 & 8 & 1 \\ 5 & 6 & 9 & 8 \\ 4 & 3 & 2 & 7 \\ 6 & -4 & 4 & 3 \end{pmatrix}$$

(10 + 12 + 11)

5) An Investigator was interested in relating gasoline mileage (Y) to engine displacement (X_1) and number of coroborator barrels (X_2). The following data were collected on 15 automobiles.

Y Miles/Galen	X_1 (cubic inch)	X_2
18.90	350	4
17.00	350	4
20.00	250	1
18.25	351	2
20.07	225	1
11.20	440	4
22.12	231	2
21.47	262	2
34.70	89.7	2
30.40	96.9	2
16.50	350	4
36.50	85.3	2
21.50	171	2
19.70	258	1
20.30	140	2

a). Obtain the least square estimate of the parameters.

b). Test the overall significance of the model.

c). Test the significance of the individual model.

(15 + 10 + 8)
