EASTERN UNIVERSITY, SRI LANKA
THIRD YEAR/SECOND SEMESTER
EXAMINATION IN SCIENCE [2002/03 & 2002/03 (A)]
ST 304- DATA ANALYSIS

Answer all questions   Time : Two hours

Q1.

(a) Suppose $X = AY$ where $X^T = [\underline{X}_1, \underline{X}_2, \underline{X}_3, \underline{X}_4, \underline{X}_5]$, $Y^T = [\underline{F}_1, \underline{F}_2]$ and A is a matrix of coefficients. If A and X (data matrix) are as below, compute the Y matrix by using **MINITAB**.

$$A = \begin{bmatrix} 2.9 & 7.0 \\ 5.8 & 4.9 \\ 5.1 & 8.9 \\ 4.9 & 9.2 \\ 8.7 & 6.7 \end{bmatrix}, \quad X = \begin{bmatrix} 23 & 34 & 45 & 11 \\ 45 & 37 & 46 & 37 \\ 23 & 64 & 55 & 62 \\ 38 & 49 & 19 & 42 \\ 45 & 37 & 85 & 74 \end{bmatrix}$$

(b) Implement the following parts in **MINITAB**

(i) Create 30 random integers between 5 and 30.

(ii) Calculate no of integers greater than 20 in the above integers.

Q2. Consider the following data recorded for 5 variables.

X1	X2	X3	X4	X5
34	11.4	34	7.9	18
36	9.7	56	8.1	17
47	10.1	45	10.1	41
48	5.9	61	9.4	36
56	6.8	39	11.0	15
61	8.2	35	8.7	34

Using **MINITAB**,

(i) Obtain the covariance matrix for 5 variables.

(ii) Obtain the eigenvalues of the matrix.

(iii) Show that the sum of eigenvalues is equal to the sum of variances.

Q3. There is some concern that TV commercial breaks are becoming longer. The following observations are obtained on the length of commercial breaks for the 1984 viewing season (January' 84- December'84) and the current season (time in minutes):

Population I 1984				Population II current		
2.42	2.16	2.23		2.28	2.39	2.25
2.00	2.35	1.95		2.36	2.63	2.31
1.17	2.40	1.38		2.05	2.29	2.44
1.18	1.47	2.42		2.45	2.39	2.57
2.32	2.82			2.64	2.11	
1.84	2.04			2.62	2.04	

Implement the following parts in **MINITAB**,

(i) Test the hypothesis $H_0 : \sigma_1^2 = \sigma_2^2$ vs $H_a : \sigma_1^2 \neq \sigma_2^2$ at 05 % level of significance

(ii) Find the confidence interval for $\dfrac{\sigma_1}{\sigma_2}$

Q4.

(a) For the data given below, write a **SAS** program to perform a t-test in order to test $H_0 : \mu = 68$ versus $H_a : \mu \neq 68$ and interpret your results.

76, 80, 84, 72, 76, 78, 69, 64, 81, 75

(b) Given the following data

X	Y
1	10
3	9
8	12
4	6
5	18

Using **SAS**,

(i) Draw a scatter diagram

(ii) Find the linear regression Y on X

(iii)Test the hypothesis that the slope of the regression is zero.