Indian Statistical Institute, Bangalore B. Math I, Second Semester, 2024-25 Mid-semester Examination Intro to Statistics and Computation with Data 20.02.25 Maximum Score 50 Duration: 2 Hours You are allowed to use calculator and one sheet of notes.

1. (2+5+5)

- (a) Write down the R command for generating a sample S of size 100 from the uniform(0,1) distribution.
- (b) How will you use S to obtain a sample of size 100 from the Beta(1,1/3) distribution.
- (c) How will you use S to obtain a sample of size 10 from the Binomial (10,1/3) distribution.
- 2. (10+2+2) Let X_1, \dots, X_n be a random sample from a uniform (θ_1, θ_2) distribution.
 - (a) Find the method of moments estimators of θ_1 and θ_2 .
 - (b) Is this the only MoM estimator, or is it possible to obtain other estimators based on the method of moments?
 - (c) Is the estimator consistent? Justify your answer.
- 3. (4) An auto analyst is conducting a satisfaction survey, sampling from a list of 10,000 new car buyers. The list includes 2,500 Maruti buyers, 2,500 Tata buyers, 2,500 Hyundai buyers, and 2,500 Mahindra buyers. The analyst selects a sample of 400 car buyers, by randomly sampling 100 buyers of each of the brands Maruti, Tata, Hyundai and Mahindra. Is this an example of a simple random sample? Justify your answer.
- 4. (6) Given the following stem and leaf plot, find the range and median.
- 5. (14) Eight pairs of "slow learners" with similar reading IQs are found, and one member of each pair is randomly assigned to the standard teaching method while the other is assigned to a new method. The reading test scores at the end of the training period for all 8 pairs are given in following table.

Pair	New Method	Standard Method
1	77	72
2	74	68
3	82	76
4	73	68
5	87	84
6	69	68
7	66	61
8	80	76

Construct 95% confidence interval for the difference in reading test scores between the two methods. Clearly describe the procedure, the assumptions and all notations used, including the standard distribution. The quantile you will need from the standard distribution has value 1.895.