Thapar Institute of Engineering and Technology, Patiala
School of Mathematics
Probabilty and Statistics (UMA401)
Practice Sheet-1

1. A random sample of 20 pieces of towels was taken and the absorbency of each piece was measured, giving following data:

18.71	21.41	20.72	21.81	19.29
22.43	20.17	23.71	19.44	20.50
18.92	20.33	23.00	22.85	19.25
21.77	22.11	19.77	18.04	21.12

   (a) Calculate sample mean and median for the above data.
   (b) Mean calculated after deleting $k\%$ of both largest and smallest set of values in the sample is called $k\%$ trimmed mean. Compute 10% trimmed mean for the above sample.
   (c) Using the values of mean, median and trimmed mean do you have any evidence of outliers in the data? Justify your answer.

2. Profit of two products manufactured by a brand in lacs of rupees for 10 consecutive months is given below:

Product 1:	9.3	8.8	6.8	8.7	8.5
	6.7	8.0	6.5	9.2	7.0
Product 2:	11.0	9.8	9.9	10.2	10.1
	9.7	11.0	11.1	10.2	9.6

   (a) Calculate sample mean and median for the data for both the products.
   (b) Plot the data for the two products on the same line and give your impression regarding any apparent differences between the popularity of the product.
   (c) Calculate the variance in profits and compare the variability in profits of both the products.

3. Sample mean of certain experiment with 10 points is 209.90. While calculating the mean one value was wrongly recorded as 221 rather than its correct value 250. Find the correct sample mean.

4. The following data represent the length of life in years, measured to nearest tenth, of 30 similar fuel pumps:

2.0	3.0	0.3	3.3	1.3	0.4
0.2	6.0	5.5	6.5	0.2	2.3
1.5	4.0	5.9	1.8	4.7	0.7
4.5	0.3	1.5	0.5	2.5	5.0
1.0	6.0	5.6	6.0	1.2	0.2

   (a) Construct a stem-and-leaf plot for the life in years of the fuel pumps.
   (b) Set up a relative frequency distribution using the above and make a histogram plot for the same.
   (c) Draw a relative frequency histogram plot for the same data using the interval length of 0.5.
   (d) Compare the both the histograms if there is any qualitative change due to change in length of interval.

5. During the manufacturing of certain spare parts in an automobile industry the material can be injected in the mold at different velocities and their is varaition in the shrinkage of the final product as tabulated below (in units of 10^4 cm):

low injection velocity	72.68	72.62	72.58	72.48	73.07
	72.55	72.42	72.84	72.58	72.92
high injection velocity	71.62	71.68	71.74	71.48	71.55
	71.52	71.71	71.56	71.70	71.50

   (a) Construct a dot plot of both data sets on the same graph. Indicate on the plot shrinkage mean for both cases.
   (b) Calculate sample variance and standard deviation for both data sets.
   (c) Based on the graph in part (a), using the location of two means and varaibility, what do you conclude regarding the effect of injection velocity on the shrinkage?

Q-1

(a) mean = 20.7675.
median = 20.61

(b) 10% trimmed mean = 20.7431

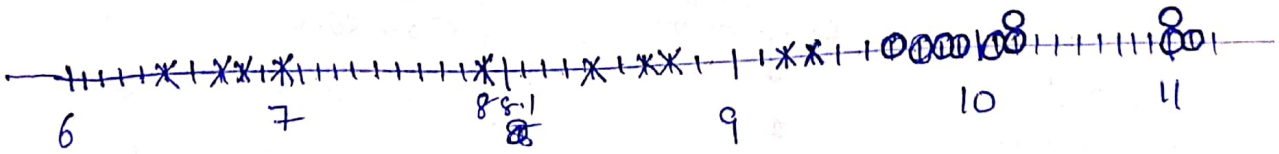
(c) Since the mean and trimmed mean are close
⇒ less chances of outlier.
Also median value is not much different from above both these ⇒ indication of lesser chances of presence of outliers.

Q-2 (a) Product 1: mean = 7.95
median = 8.25

Product 2:- mean = 10.26.
median = 10.15

(b)

x → Product 1.
o → Product 2



→ Profit of product 2 is higher ⇒ seemingly product 2 is more popular.

→ Profit of product 1 is more variable as compared to product 2.

(c) Variance :- Prod 1 = 1.2072 , Prod 2 = 0.3249.
→ Variability in product 1 data is large as compared to product 2.

Q.3 ∴ Corrected mean = 212.8.

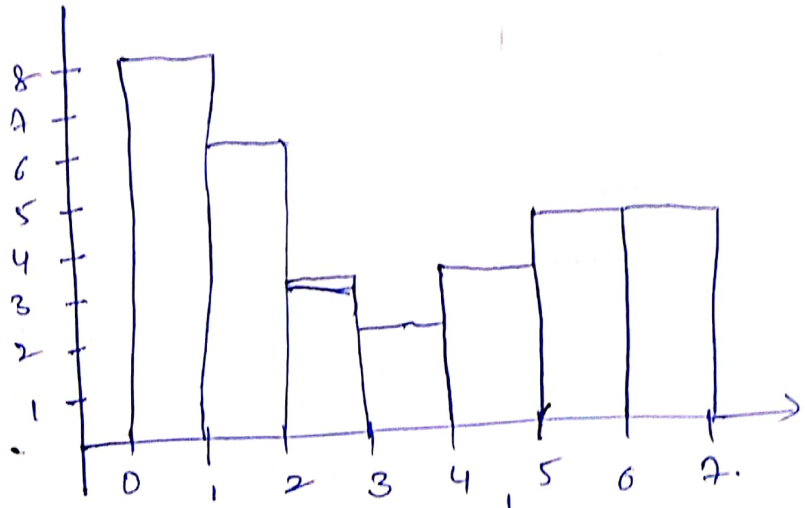
Q.4 (a)

Stem	leaf	frequency	leaf
0	0.2, 0.2, 0.3, 0.3, 0.4, 0.5, 0.5, 0.8, 0.9	8	2 2 3 3 4 5 5 8 9
1	1.5, 1.0, 1.5, 1.8, 1.9	6	5 0 5 8 9
2	2.0, 2.5, 2.8	3	0 5 8
3	3.0, 3.8	2	0 8
4	4.5, 4.0, 4.7	3	5 0 7
5	5.5, 5.9, 5.6, 5.0	4	5 9 6 0
6	6.0, 6.0, 6.5, 6.0	4	0 0 5 0

⇒ Stem and Leaf plot display in the above table.

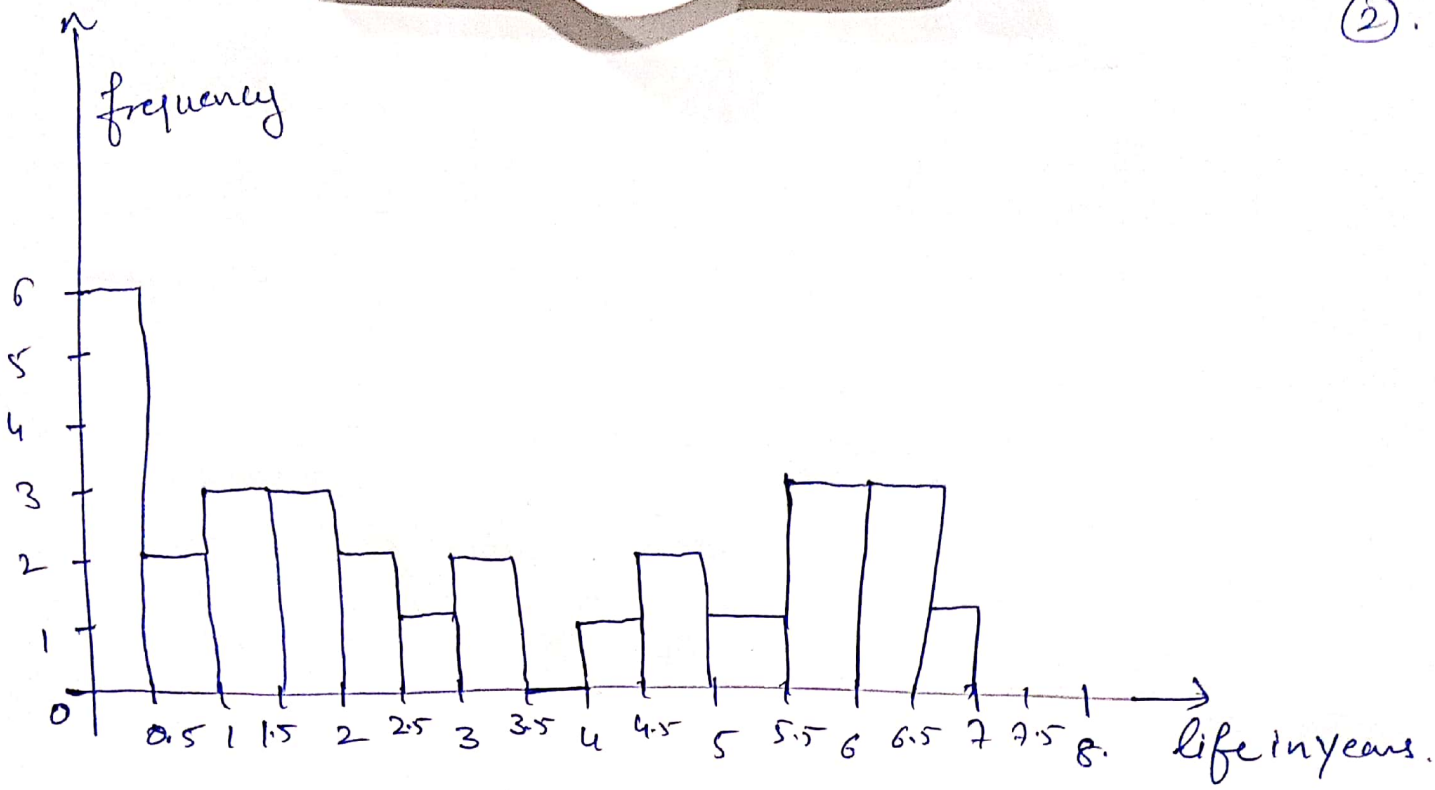
(b)

⇒ Relative freq. plot.



(c)

Range	frequency
0.0 – <0.5	0
≤0.5 – <1.0	2
≤1.0 – <1.5	3
≤1.5 – <2.0	3
≤2.0 – <2.5	2
≤2.5 – <3.0	1
≤3.0 – <3.5	2
≤3.5 – <4.0	0
≤4.0 – <4.5	1
≤4.5 – <5.0	2
≤5.0 – <5.5	1
≤5.5 – <6.0	3
≤6.0 – <6.5	3
≤6.5 – <7.0.	1.



→ Decrease in length of the interval introduced a scatter and is negatively affecting. a clear minima seen in earlier range.

→ minima is visible in the range 3–4 in both the plots, but is more clearly seen in ~~the~~ first plot.

Q-5 Try yourself, all the formulas are used in Q-1 to Q-4