Frequency Distribution Table

The **frequency distribution table** (FDT) is a way of summarizing data by showing the number of observations that belong in the different categories or classes. We also refer to this as grouped data.

Concepts related to FDT

- **Class interval** is the range of values that belong in the category.
- **Class frequency** is the number of observations that belong in a class interval
- **Class limits** are the end number of a class interval. The lower class limit (LCL) is the lower end of the class interval and the upper class limit (UCL) is the upper end of the class interval.

  Open class interval is a class interval with no lower class limit or no upper class limit. Example:
- **Class size** is the size of the class interval. It is the difference between the upper class limits of the class and the preceding class; or the difference between the lower class limits of the next class and the class. Example
- **Class boundaries** are the true class limits. If the observations are rounded figures then we identify the class boundaries based on the standard rules of rounding. The **lower class boundary** (LCB) is halfway between the lower class limit of the class and the upper class limit of the preceding class while the **upper class boundary** (UCB) is halfway between the upper class limit of the class and the lower class limit of the next class.
- **Class Mark** is the midpoint of a class interval. It is the average of the lower class limit and the upper class limit or the average of the lower class boundary and upper class boundary of a class interval.

Steps in Constructing the FDT

1. Determine the adequate number of classes denoted by K.
   There are no precise rules concerning the optimal **number of classes** but the following formula can be used as a first approximation: $K = 1 + 3.322(log(n))$.
2. Determine the range, $R = highest\ observed\ value - smallest\ observed\ value$
3. Compute for the pre-class size $C' = R/K$
4. Determine the class size, C, by rounding-off C' to a convenient number
5. Choose the lower class limit of the first class. Make sure that the smallest observation will belong in the first class.
6. List the class intervals. Determine the lower class limits of the succeeding classes by adding the class size to the lower class limit of the previous class. The last lass should include the largest observation.
7. Tally all the observed values in each class interval
8. Sum the frequency column and check against the total number of observations

Additional Components of FDT

- **Relative Frequency** is the class frequency divided by the total number of observations
- **Relative Frequency Percentage** (RFP) is relative frequency multiplied by 100.
- Cumulative Frequency Distribution o The **less than cumulative frequency distribution** (<CFD) shows the number of observations with values smaller than or equal to the upper class boundary.

- The **greater than cumulative frequency distribution** (>CFD) shows the number of observations with values higher than or equal to the lower class boundary.

Example

Given below are the grades of 100 students who took Stat 101 in 2017.

92	62	84	94	71	61	50	62	94	83
62	96	79	66	98	75	61	88	70	92
91	58	97	69	83	74	71	53	91	86
88	55	65	93	85	67	59	96	54	84
95	74	99	51	60	55	76	52	77	71
83	60	72	88	79	76	62	80	97	77
88	66	97	51	98	54	54	82	65	90
92	63	98	57	61	98	84	66	83	70
86	99	95	86	98	76	67	90	96	61
90	58	91	62	84	62	76	67	84	65

Construct a frequency distribution table with all the components discussed.

0. Arrange the data into an array.
1. Compute for $K = 1 + 3.322(log(n))$

   $K = 1 + 3.322(log(100)) = 1 + (3.322 * 2) = 7.644 \approx 8$
2. Compute for $R = highest\ observed\ value - smallest\ observed\ value$
3-4. Compute for C' and eventually C

   $C' = R/K = 49/8 = 6.125 \approx 7$

   Note: Recommended class sizes are multiples of 5, 10, 25, 50, 100, etc. 5-8.

Class Limits		Class Boundaries		Frequency	Class Mark	RF	RFP	CFD	
LCL	UCL	LCB	UCB	f	x	f/n	%	<CFD	>CFD
50	56	49.5	56.5	10	53	0.1	10	10	100
57	63	56.5	63.5	17	60	0.17	17	27	90
64	70	63.5	70.5	12	67	0.12	12	39	73
71	77	70.5	77.5	13	74	0.13	13	52	61
78	84	77.5	84.5	13	81	0.13	13	65	48
85	91	84.5	91.5	14	88	0.14	14	79	35
92	98	91.5	98.5	19	95	0.19	19	98	21
99	105	98.5	105.5	2	102	0.02	2	100	2
				n=100		1.00	100		