STAT 05 DISCUSSION 3

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https://github.com/Zsj950708/STAT05-Discussion

CHAPTER 4

CROSS SECTIONAL/LONGITUDINAL DATA

- Cross sectional data
- – picture of a population at a given point in time, and one of the variables measured is age/ year.
- In a cross-sectional study, different subjects are compared to each other at one point in time.

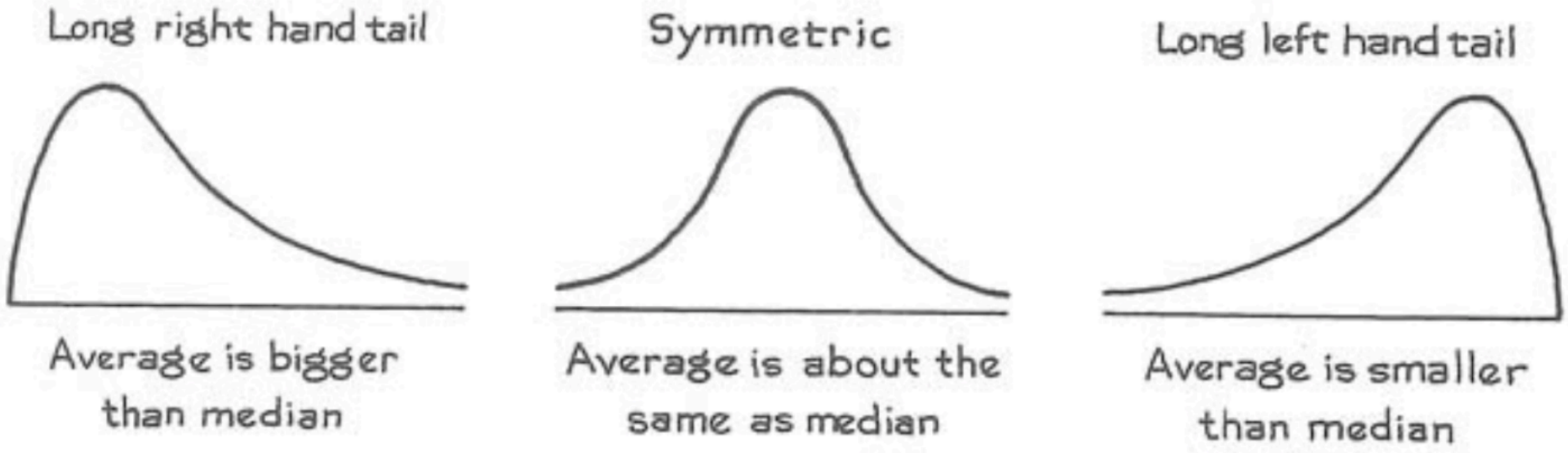
- Longitudinal data
- – each individual is followed as time goes by.
- In a longitudinal study, subjects are tracked over time, and compared with themselves at different points in time.

EXAMPLE

- Whether average height of men appears to decrease after age 50?
- 1. A sample of people from different ages and calculate the average height in each age.
- 2. A sample of people at their 20s. And record height data each year from their 20s to 60s. Calculate the average height in each age.

TAILS OF HISTOGRAM

Figure 7. The tails of a histogram.



STANDARD DEVIATION

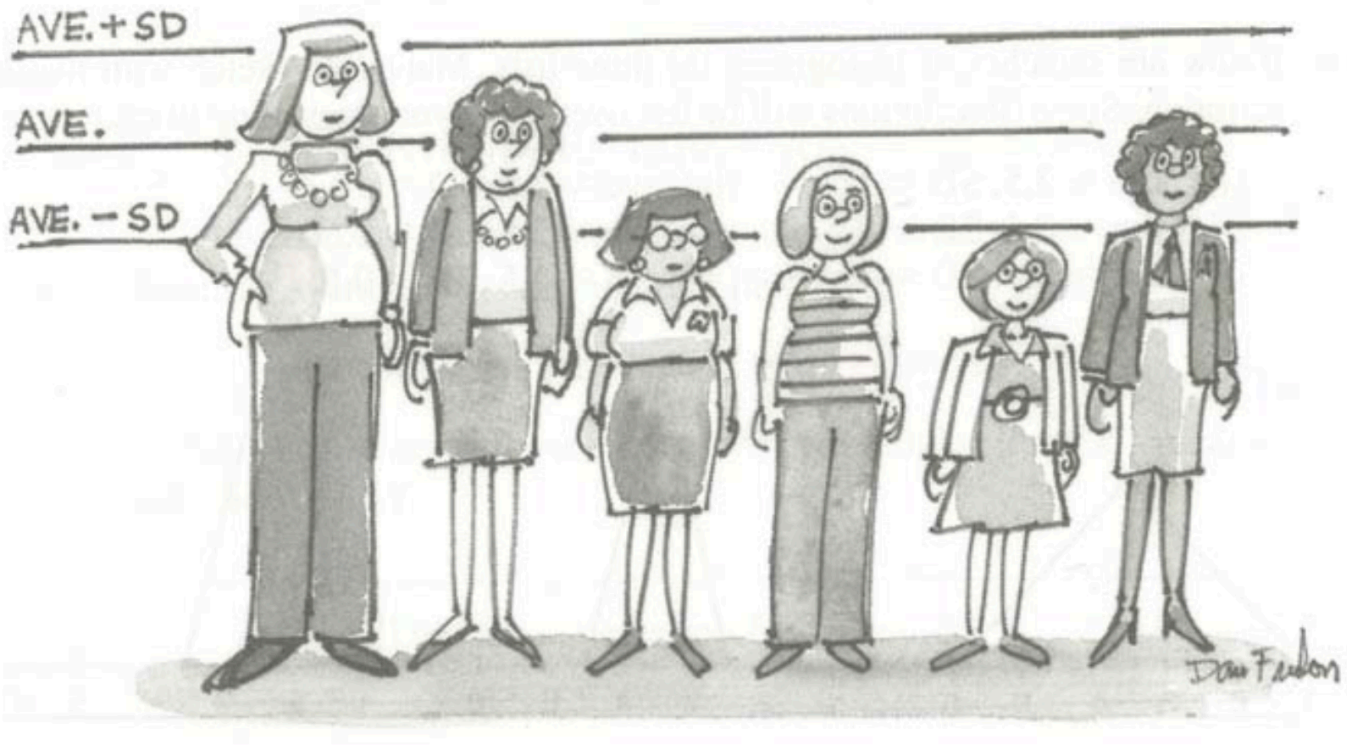
- SD = r.m.s deviation from the average= $\sqrt{\frac{\sum(x_i - mean(x_i))^2}{n}}$

- 1. Use numbers minus the mean.
- 2. Square the above result.
- 3. Mean of the above result.
- 4. Square root of the above result

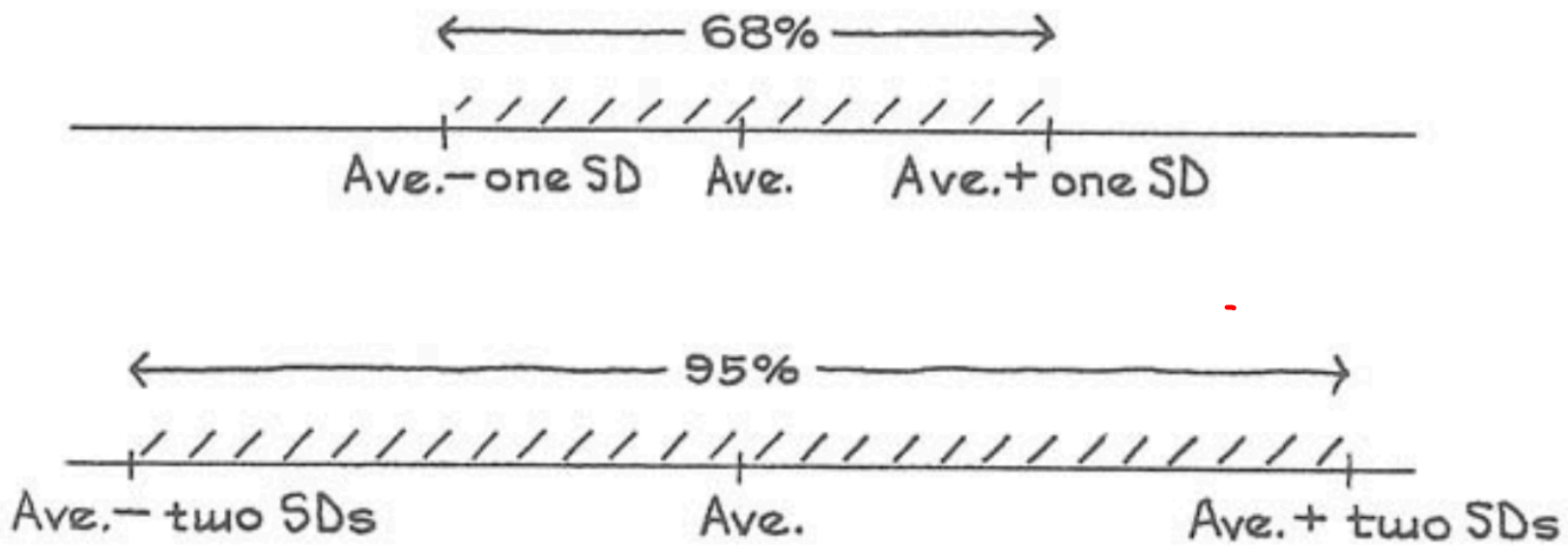
STANDARD DEVIATION

- **The SD says how far away numbers on a list are from their average.**

- Most number on the list will be somewhere around one SD away from the average. Very few will be more than two or three SDs away.



Roughly 68% of the entries on a list (two in three) are within one SD of the average, the other 32% are further away. Roughly 95% (19 in 20) are within two SDs of the average, the other 5% are further away. This is so for many lists, but not all.



GUESS THE SD

CHAPTER 5

STANDARD NORMAL DISTRIBUTION(CURVE)

- 1. Bell shape
- 2. Mean = 0
- 3. SD = 1
- 4. Variance = 1

Z SCORE

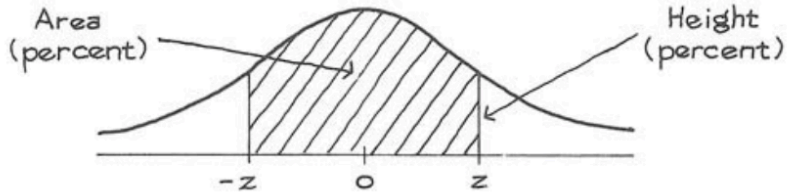
- Z score = (number – mean) / SD
- Z score tells how many SDs a value is above (+) or below (-) the average.

- Normal approximation: Convert all number into Z score

PERCENTILE

- A number related to rank
- -1 is 16% percentile means that numbers less than -1 accounts for 16%
- 2 is 97.5% percentile means that numbers less than 2 accounts for 97.5% or only 2.5% numbers are larger than 2.
- 1 is ? % percentile means.... 84%
- -2 is ? % percentile means.... 2.5%

Tables



A NORMAL TABLE

z	Height	Area	z	Height	Area	z	Height	Area
0.00	39.89	0	1.50	12.95	86.64	3.00	0.443	99.730
0.05	39.84	3.99	1.55	12.00	87.89	3.05	0.381	99.771
0.10	39.69	7.97	1.60	11.09	89.04	3.10	0.327	99.806
0.15	39.45	11.92	1.65	10.23	90.11	3.15	0.279	99.837
0.20	39.10	15.85	1.70	9.40	91.09	3.20	0.238	99.863
0.25	38.67	19.74	1.75	8.63	91.99	3.25	0.203	99.885
0.30	38.14	23.58	1.80	7.90	92.81	3.30	0.172	99.903
0.35	37.52	27.37	1.85	7.21	93.57	3.35	0.146	99.919
0.40	36.83	31.08	1.90	6.56	94.26	3.40	0.123	99.933
0.45	36.05	34.73	1.95	5.96	94.88	3.45	0.104	99.944
0.50	35.21	38.29	2.00	5.40	95.45	3.50	0.087	99.953
0.55	34.29	41.77	2.05	4.88	95.96	3.55	0.073	99.961
0.60	33.32	45.15	2.10	4.40	96.43	3.60	0.061	99.968
0.65	32.30	48.43	2.15	3.96	96.84	3.65	0.051	99.974
0.70	31.23	51.61	2.20	3.55	97.22	3.70	0.042	99.978
0.75	30.11	54.67	2.25	3.17	97.56	3.75	0.035	99.982
0.80	28.97	57.63	2.30	2.83	97.86	3.80	0.029	99.986
0.85	27.80	60.47	2.35	2.52	98.12	3.85	0.024	99.988
0.90	26.61	63.19	2.40	2.24	98.36	3.90	0.020	99.990
0.95	25.41	65.79	2.45	1.98	98.57	3.95	0.016	99.992
1.00	24.20	68.27	2.50	1.75	98.76	4.00	0.013	99.9937
1.05	22.99	70.63	2.55	1.54	98.92	4.05	0.011	99.9949
1.10	21.79	72.87	2.60	1.36	99.07	4.10	0.009	99.9959
1.15	20.59	74.99	2.65	1.19	99.20	4.15	0.007	99.9967
1.20	19.42	76.99	2.70	1.04	99.31	4.20	0.006	99.9973
1.25	18.26	78.87	2.75	0.91	99.40	4.25	0.005	99.9979
1.30	17.14	80.64	2.80	0.79	99.49	4.30	0.004	99.9983
1.35	16.04	82.30	2.85	9.69	99.56	4.35	0.003	99.9986
1.40	14.97	83.85	2.90	0.60	99.63	4.40	0.002	99.9989
1.45	13.94	85.29	2.95	0.51	99.68	4.45	0.002	99.9991

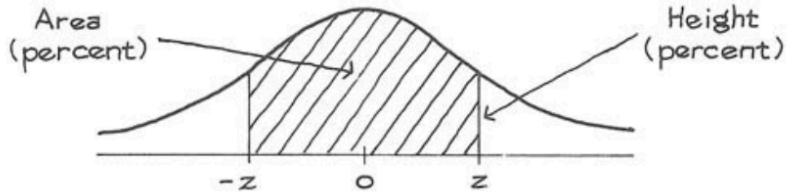
-1 is 16% percentile means that numbers less than -1 accounts for 16%
2 is 97.5% percentile means that numbers less than 2 accounts for 97.5% or only 2.5% numbers are larger than 2.
1 is ? % percentile means.... 84%
-2 is ? % percentile means.... 2.5%

EXAMPLE 1

- A normal data with Mean = 50, SD =10

- 1. Find 90^{th} percentile for this data
- 2. Find 30^{th} percentile for this data

Tables



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0.15	39.45	11.92	1.65	10.23	90.11	3.15	0.279	99.837
0.20	39.10	15.85	1.70	9.40	91.09	3.20	0.238	99.863
0.25	38.67	19.74	1.75	8.63	91.99	3.25	0.203	99.885
0.30	38.14	23.58	1.80	7.90	92.81	3.30	0.172	99.903
0.35	37.52	27.37	1.85	7.21	93.57	3.35	0.146	99.919
0.40	36.83	31.08	1.90	6.56	94.26	3.40	0.123	99.933
0.45	36.05	34.73	1.95	5.96	94.88	3.45	0.104	99.944
0.50	35.21	38.29	2.00	5.40	95.45	3.50	0.087	99.953
0.55	34.29	41.77	2.05	4.88	95.96	3.55	0.073	99.961
0.60	33.32	45.15	2.10	4.40	96.43	3.60	0.061	99.968
0.65	32.30	48.43	2.15	3.96	96.84	3.65	0.051	99.974
0.70	31.23	51.61	2.20	3.55	97.22	3.70	0.042	99.978
0.75	30.11	54.67	2.25	3.17	97.56	3.75	0.035	99.982
0.80	28.97	57.63	2.30	2.83	97.86	3.80	0.029	99.986
0.85	27.80	60.47	2.35	2.52	98.12	3.85	0.024	99.988
0.90	26.61	63.19	2.40	2.24	98.36	3.90	0.020	99.990
0.95	25.41	65.79	2.45	1.98	98.57	3.95	0.016	99.992
1.00	24.20	68.27	2.50	1.75	98.76	4.00	0.013	99.9937
1.05	22.99	70.63	2.55	1.54	98.92	4.05	0.011	99.9949
1.10	21.79	72.87	2.60	1.36	99.07	4.10	0.009	99.9959
1.15	20.59	74.99	2.65	1.19	99.20	4.15	0.007	99.9967
1.20	19.42	76.99	2.70	1.04	99.31	4.20	0.006	99.9973
1.25	18.26	78.87	2.75	0.91	99.40	4.25	0.005	99.9979
1.30	17.14	80.64	2.80	0.79	99.49	4.30	0.004	99.9983
1.35	16.04	82.30	2.85	9.69	99.56	4.35	0.003	99.9986
1.40	14.97	83.85	2.90	0.60	99.63	4.40	0.002	99.9989
1.45	13.94	85.29	2.95	0.51	99.68	4.45	0.002	99.9991

A normal data with Mean = 50, SD =10

1. Find 90th percentile for this data
2. Find 30th percentile for this data
3. How many percentage of total population would lie between [40, 60]?

QUIZ

- A normal data with Mean = 50, SD =10
- 1. Find 20^{th} percentile for this data

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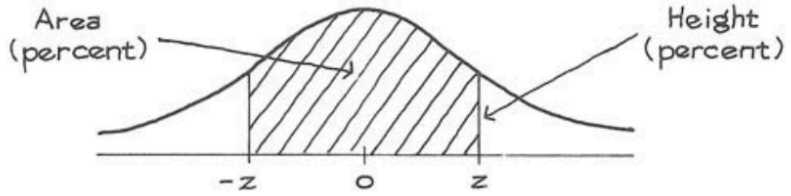

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