P315

CH: Measurments.

1. Initial observation.
2. Research study
3. Measure behaviour
4. Evaluate findings.

- temporal precedence: $Y \nrightarrow X$.
- Experimental Control: $Z \nrightarrow X$.
- Statistics: not-Random.

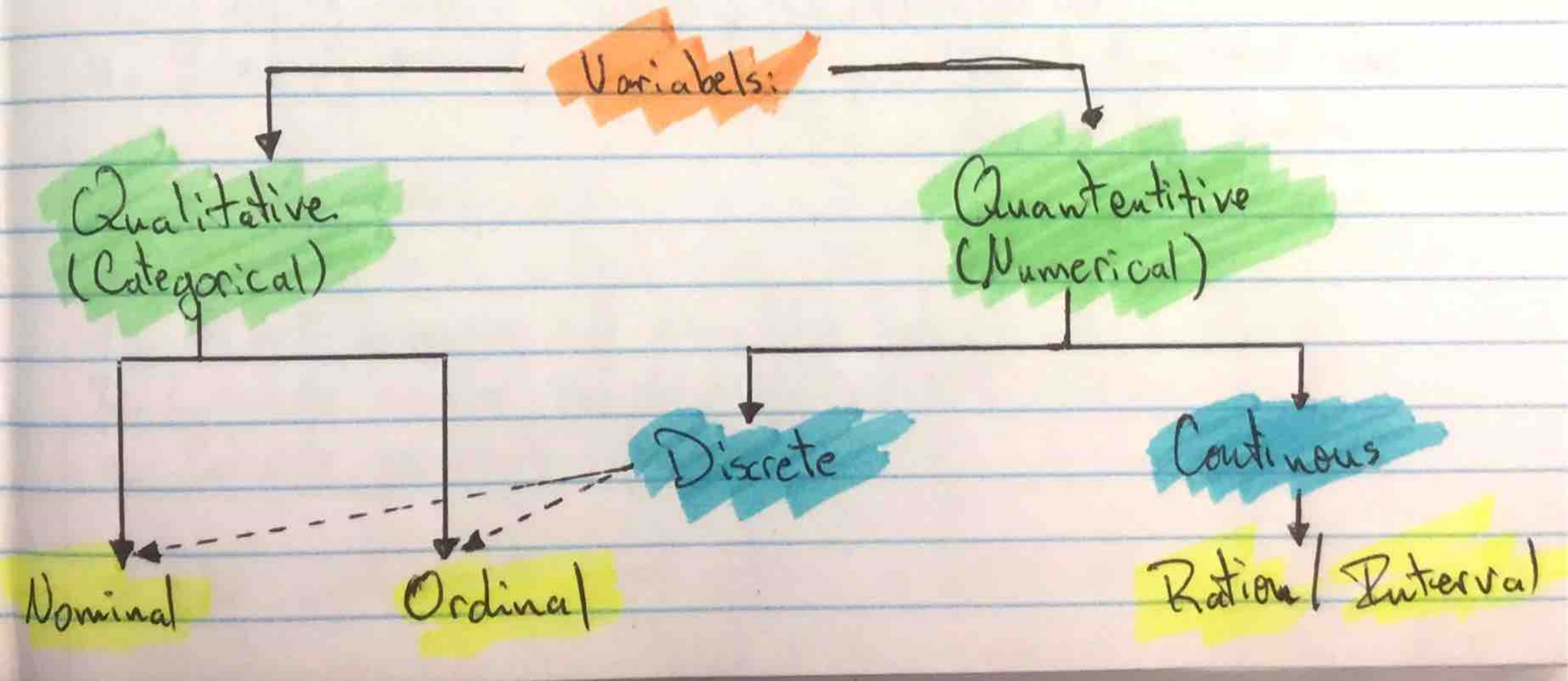
Population vs Sample:

- Population: all members of well-defined Group.
  - → Parameter: Characteristic of popnlation.
- Sample: subset of population.
  - → Statistic: Characteristic of Sample.

Sampleing:

- -Random: equal Chance of all members of population of being Selected.
  - - Bias: not all members have equal chance.
  - - Sampleing Error: difference between Sample stats and population parameter.

- Variabels:
  Characteristics observed to take different values.
- Constants: take only a Single Value.



Dichotomous: one of two values.

properties of Measurments:

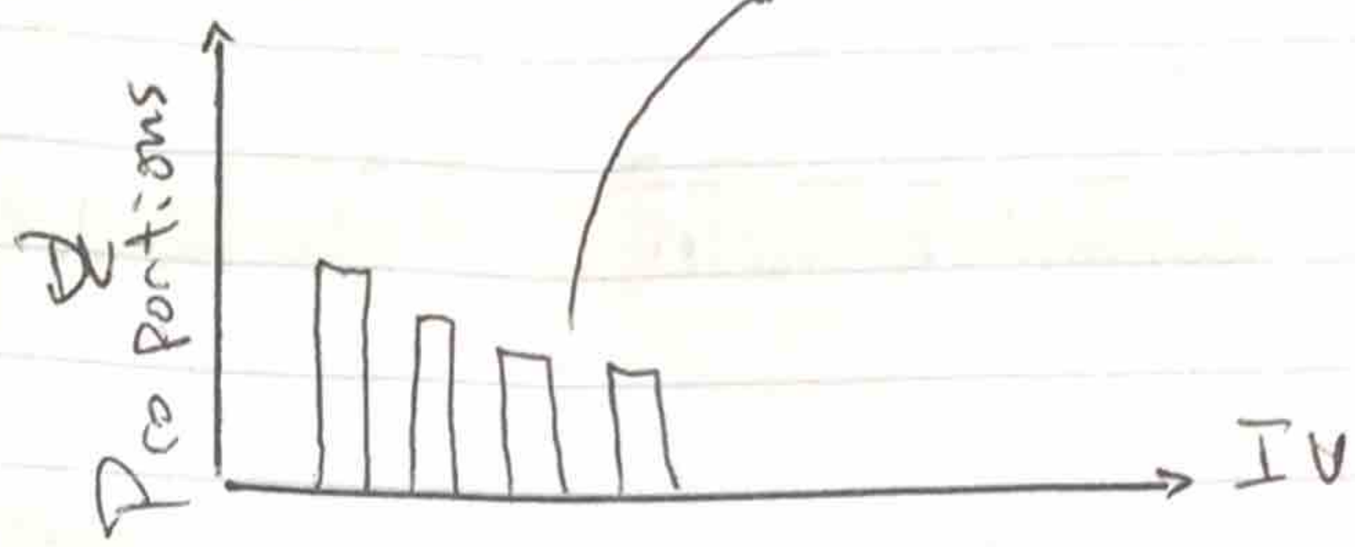
Order	Differenee	Ratio:
larger better?	Substracte Meaningful?	divide Meaningful?

Nominal	Ordinal	Interval	Ratio
- equal along Category - Mutually exclusive.	- Rank - differences between Ranks are Meaningless	- Rank & difference - No absolute Zero - No Ratios.	- Rank & differenea - Absolute Zero - Ratios

Reliable: Same measurment Under Same Conditions.
Valid: Measuring what it Says it Measures.

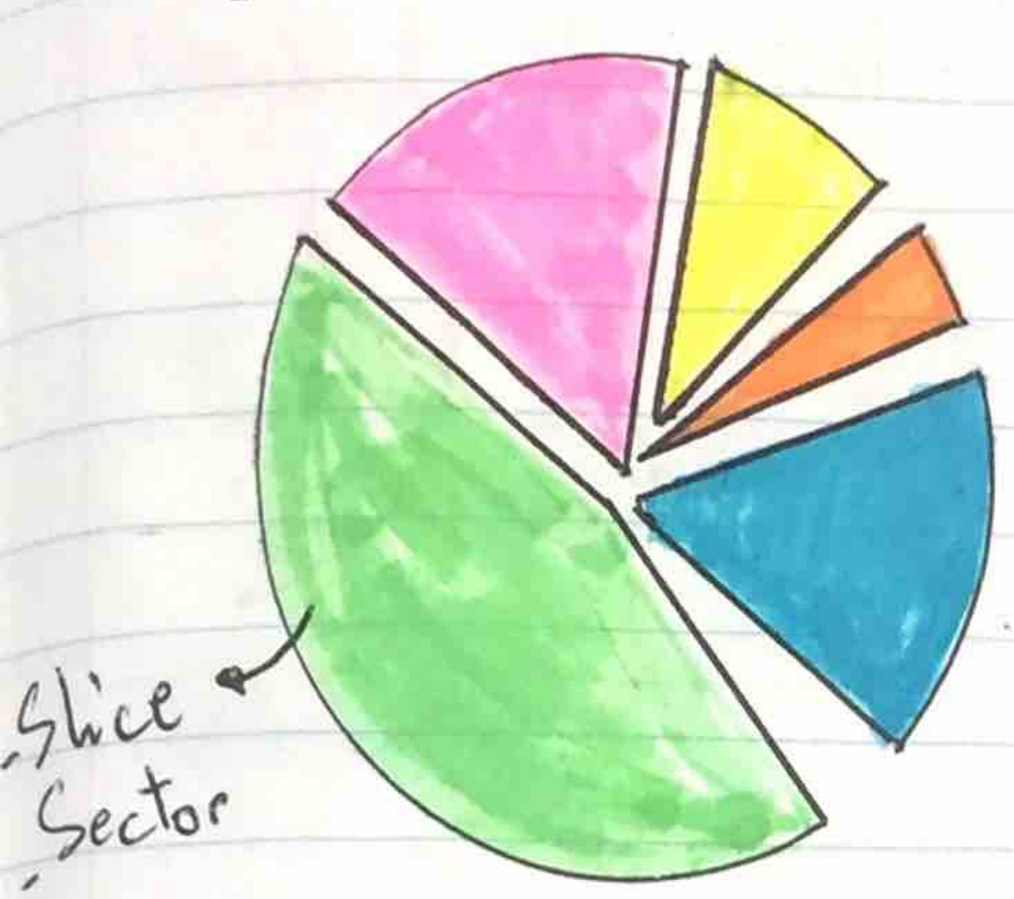
Ch 2: Frequency and probability:

Constant width



proportion:

$p = f/N$



Categories

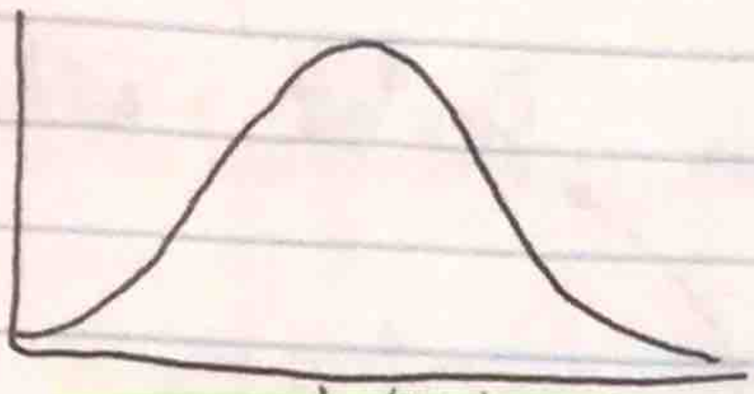
- all Slices add up to (100%)
- best for nominal & ordinal.

Cumulative proportion

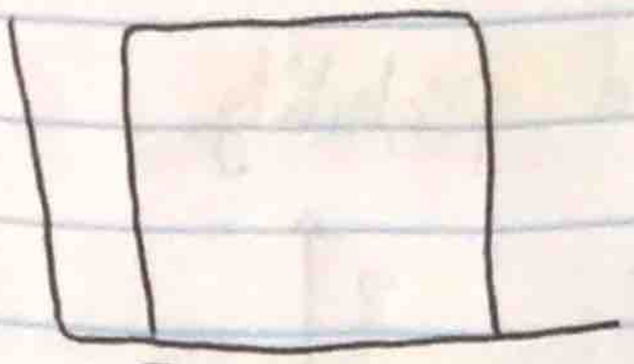
$p = \frac{\text{Cumulative } f}{n}$

1- Determine lowest & highest
2- Identify Range = (Highest - lowest) + 1
3- Identify width = Range / # of Interval desired
4- Identify lowest Interval value. → lowest than lowest value.
   ↳ divisable by width.
5- Identify class label
6- Identify real limits (-0.01, +0.99)
7- Count frequencies of every Interval.
8- Calculate relative frequency (proportion)
9- Calculate percentage (p·100%)

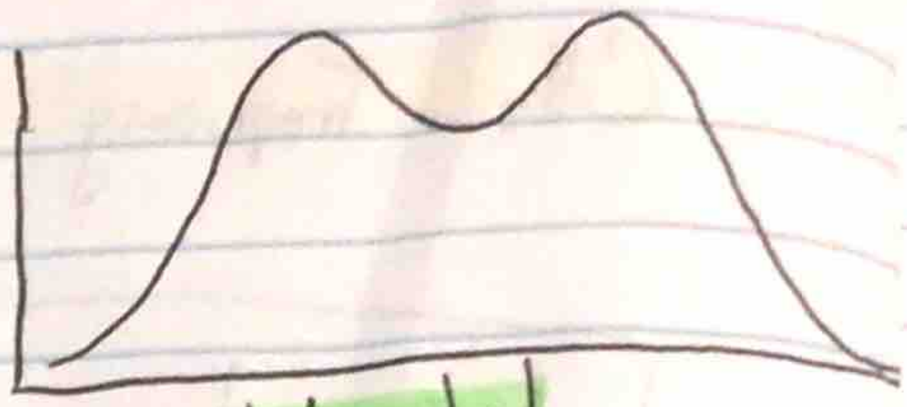
* add limit point up or down (be consistant).



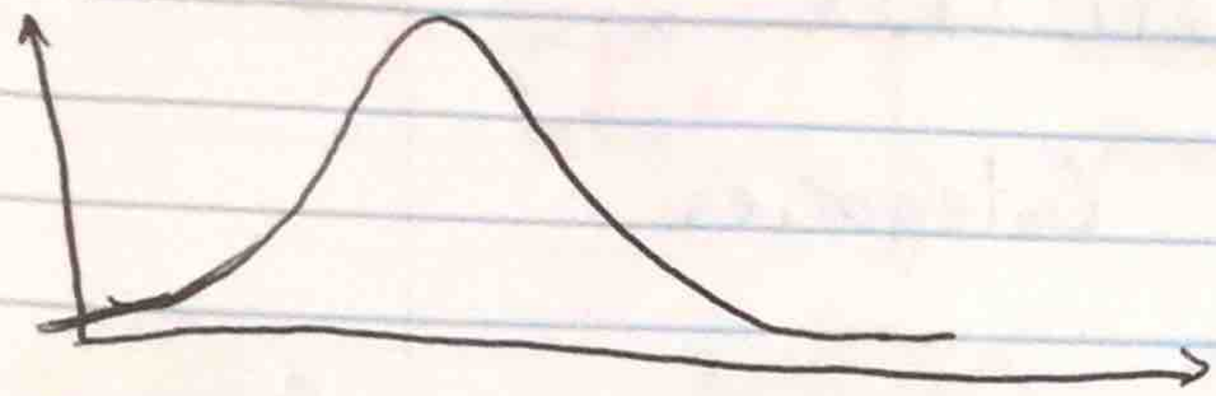
normal / Unimodal



Rectangular

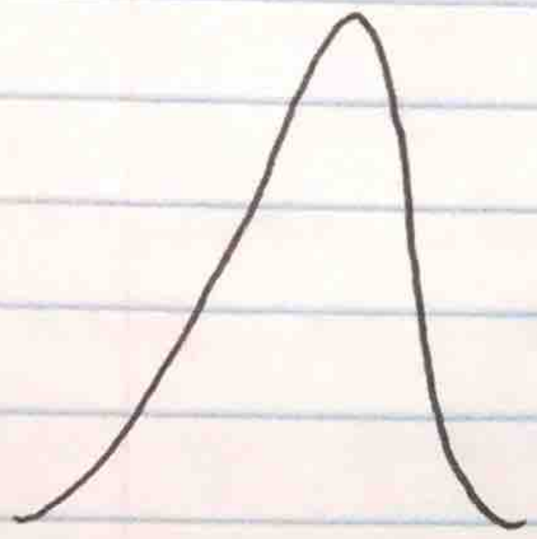


bimodal



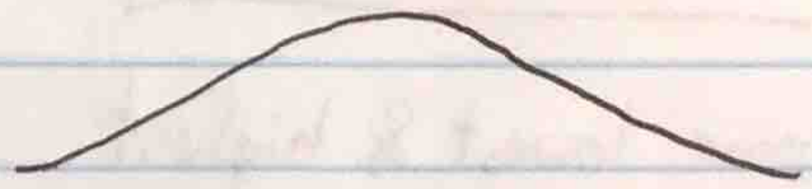
- Positive skew
  - floor effect

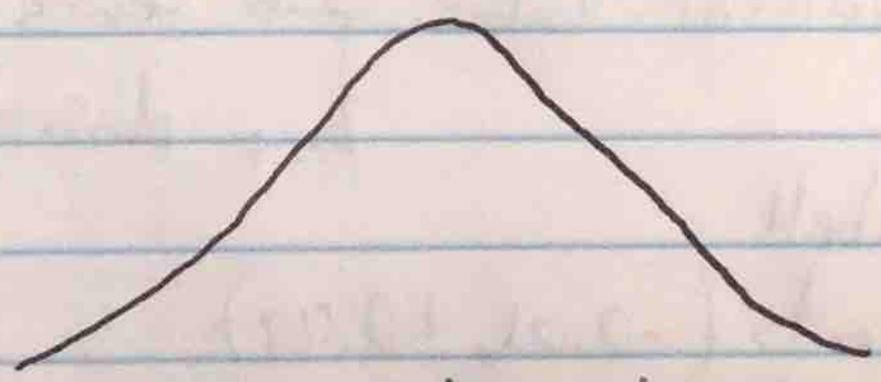
- Negative skew
  - Ceiling effect



- leptokurtic (Positive kurtosis)
  - pile up Narrowly

- platykurtic (Negative)
  - relatively flat





Mesokurtic (No kurtosis)

Ch3: Central Tendency.

- **Mean:**

$$\mu = \frac{\Sigma X}{N}$$ population

$$M(\bar{X}) = \frac{\Sigma X}{n}$$ Sample.

Weighted Mean: $M_w = \frac{\Sigma(M \cdot n)}{\Sigma n}$ → Weighted Sum

↳ Combined n

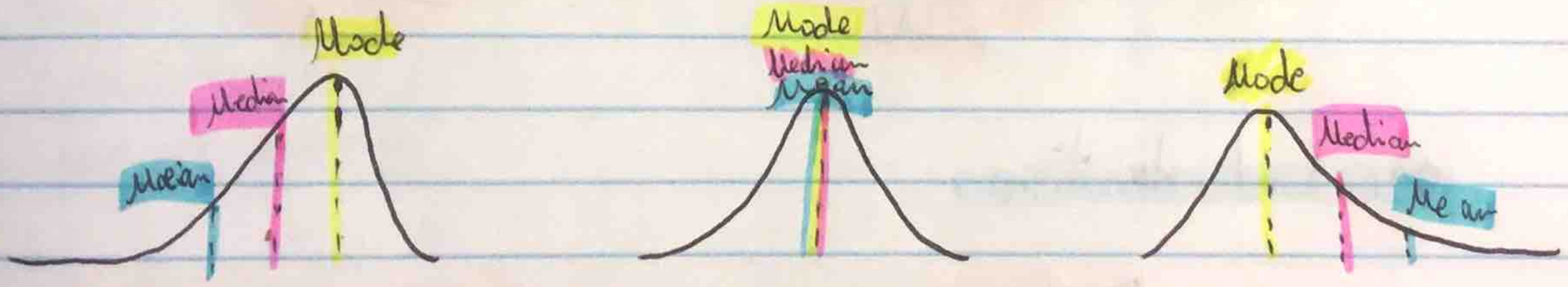
- Function for every score / Unique Value / stable/
- Influence by extreme scores / Interval & Ratio only/

- **Median:**
  - Not influence by extreme / Unique Value/
  - Not function of all scores / Not stable / every thing except nominal.

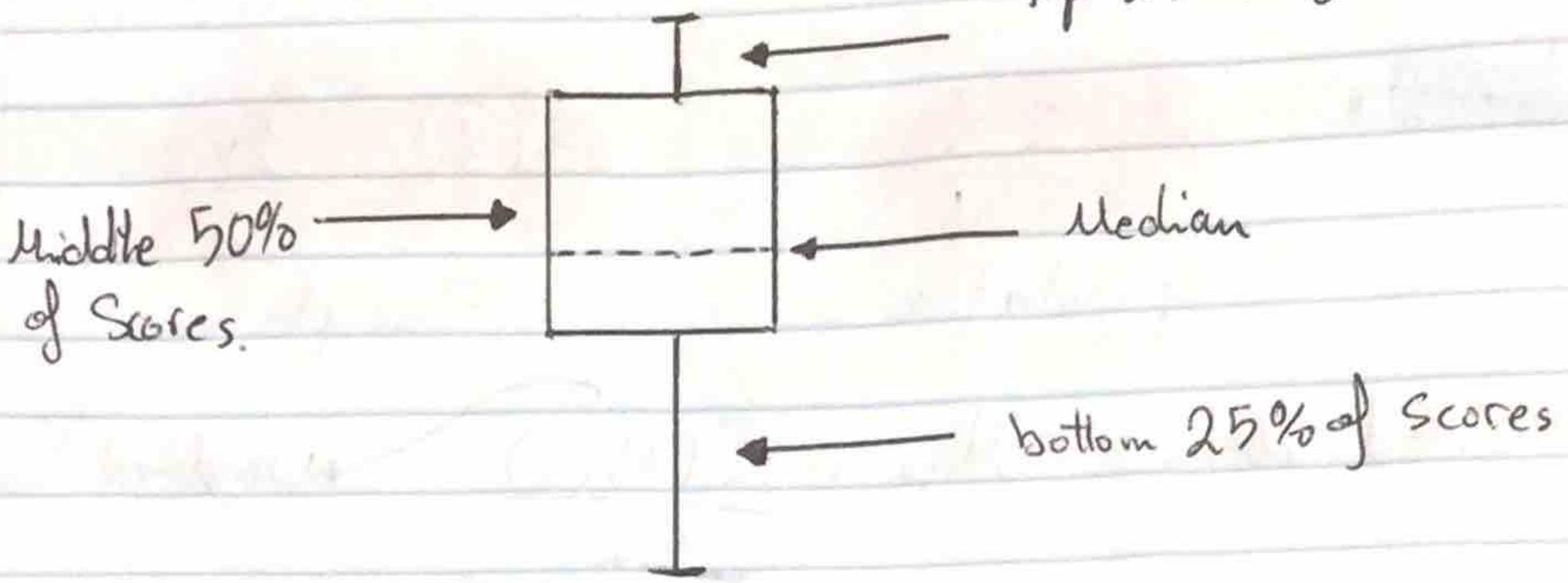
- **Mode:**
  - Simple to obtain / all scales /
  - Not Unique / not function of scores / not stable.

on graphs: =>

Mode → Median → Mean.		negative
Mean → Median → Mode		positive
Median, Mode, Mean		normal



box plote:



Variablity:

Range = highest - lowest.
- Simple / Alertive / ordinal, Interval, and Ratio
- Influenced by extreme Scores / function of 2 Scores / Not stable

Deviation Score: $|X-M|$ $|X-\mu|$

$\Sigma(x-M)=0$

Sum of squares:

$$SS=\Sigma(x-M)^2$$

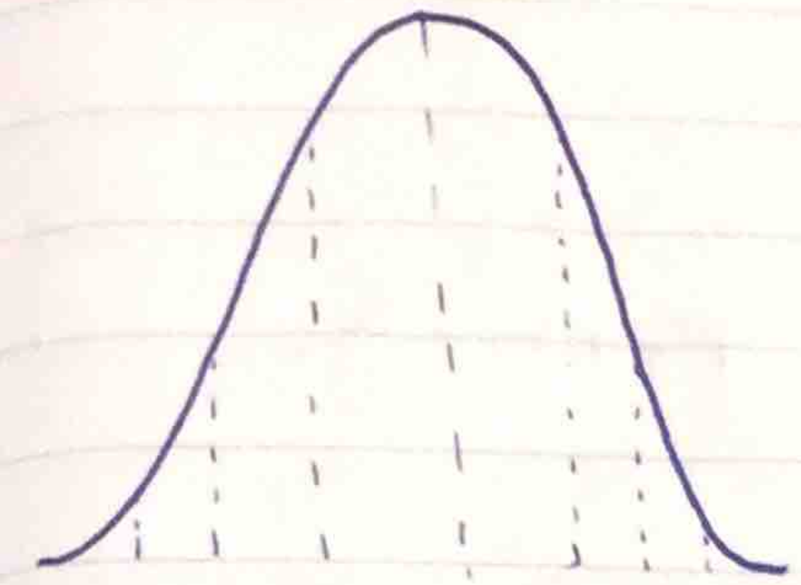
Variance:

$$\sigma^2=\frac{\Sigma(x-\mu)^2}{N} \qquad s^2=\frac{\Sigma(x-M)^2}{n-1}$$

standard deviation:

$$\sigma=\sqrt{\frac{\Sigma(x-\mu)^2}{N}} \qquad s=\sqrt{\frac{\Sigma(x-M)^2}{n-1}}$$

CH4: Normal Distribution:



0 → 1/-1 ⇒ 0.3413
-1/1 → -2/2 ⇒ 0.1359
-2/2 → -3/3 ⇒ 0.0215
-3/3 → -∞/∞ ⇒ 0.0013

Z-Score: when normal distribution = Convert to Z-scores and Compare

$$Z = \left(\frac{x - \mu}{\sigma}\right) \qquad x = Z\cdot\sigma + \mu$$

Rules:

1- $P(z)$ = the probability that a randomly chosen score will be less than z.
2- $1 - P(z)$ = the probability that a randomly chosen score will be greater than z
3- $P(z_2) - P(z_1)$ = " " " " between z_1 & z_2 $(z_2 > z_1)$
4- $1 - [P(z_2) - P(z_1)]$ = " " " " outside z_1 & z_2 $(z_2 < z_1)$

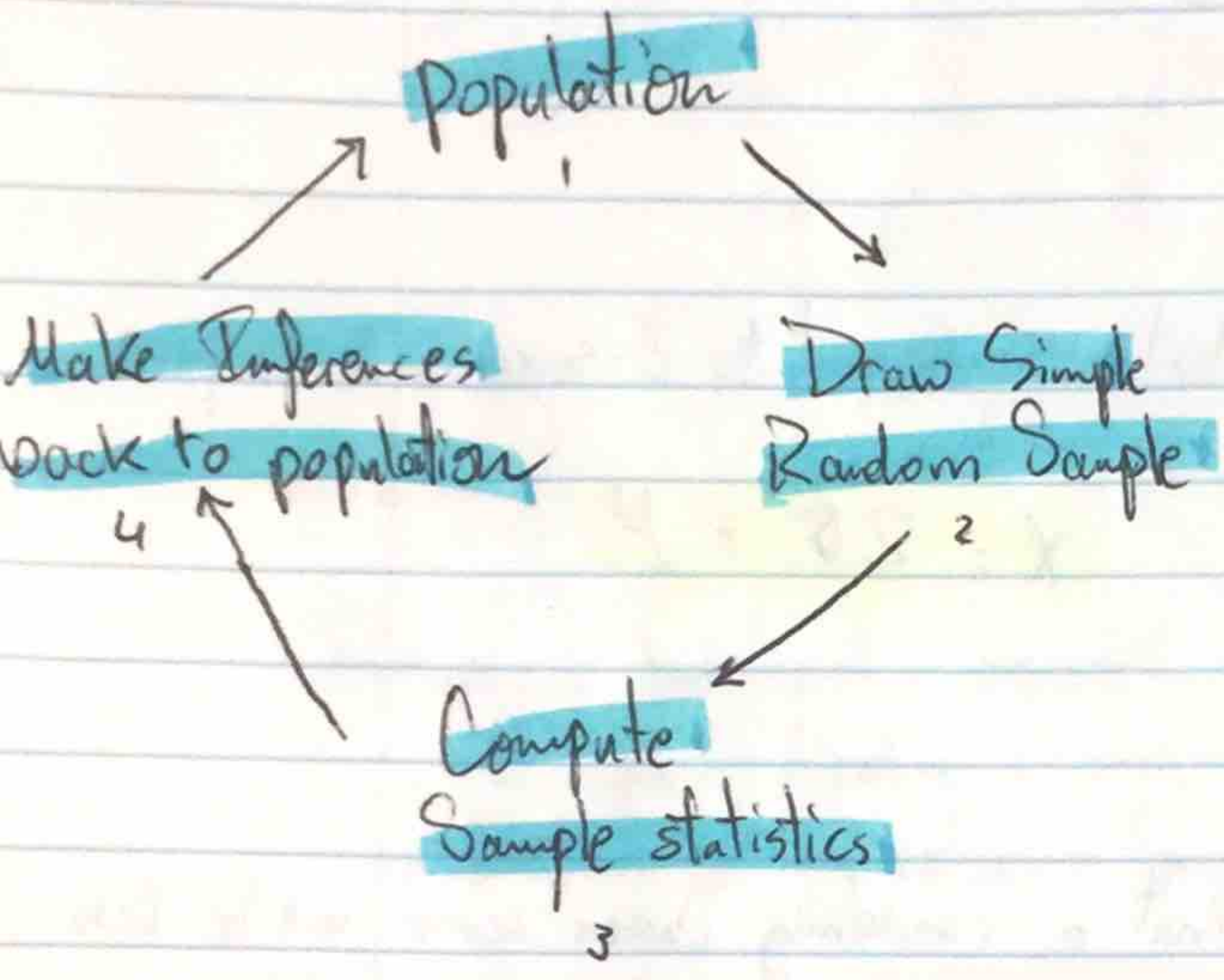
to find $Z_{\alpha/2}$ given α:

$(1-\alpha)100\%$

- Find $\alpha/2$
- Find Z-score of $\alpha/2$
- Absolute Value

CH5: Sampling Distributions:

Random Sampling:
- Ideal / Widely used / difficult.
  Equal & Independent probability.



Convenience Sampling:
- Not Ideal (Biased) / limits generalizability / Dangers of volunteer Samples (Self-Selection) / worse if Sample Size is small.

→ Replication as a Solution.
  Duplication of results in a different context or with different Characteristics.

Sampling with Replacement
put back into ~~Sample~~ population

# of Sample means = N^n

Sampling without Replacement
not put back into population.

# of Sample means < N^n

Distribution of Means:

- plot of means of Samples obtained from a population
- will follow a normal distribution (unimodal).
- Constant Sample Size

→ Population Mean (μ) = Sampling Distribution Mean (μ_M)

→ standard ~~deviation~~ Error

$$SEM\ (\sigma_m) = s/\sqrt{n}$$

s → standard deviation

n → Sample Size

* larger Sample Size will lead to less variability. (≈ 30)

$$SEM\ (\sigma_m) = \frac{\sigma}{\sqrt{n}}$$

→ ~~Sam~~ Standard deviation of population