→ lec 1

Data :- The values of observation for the variable is known Data

variable :- is the characteristics that observed in person, things, places.
* Isn't the same

Descriptive statistics :- This one serve as device for organizing & summarizing data & bringing into a focus their essential characteristics Descriptive statistics

→ lec "2"

* Nominal → simple frequency table
* continuous Metric variable → grouped frequency distribution

_ pie chart → Nominal & ordinal data
→ Disadvantage of pie chart ⇒ ① It can only represented one variable
→ Advantage of pie chart ⇒ Excellent in showing part vs. whole comparisons

_ BAR chart → qualitative & quantitative discrete type
→ type : ① simple bar chart ② clustered bar chart ③ stacked bar chart
→ excellent for showing magnitude differences

_ Histogram chart → quantitative continuous metric variable
→ The table is of simple or complex

* shape of Histogram
1. symmetrical, normal, or bell shaped S.N.B
2. uniform rectangular
3. skewed right or + skewed
4. skewed left or − skewed
5. Bimodal, uni multi modal
6. Dotplot

* The mid point $= \frac{\text{value 1} + \text{value 2}}{2}$

_ The line graph → used when we are dealing with a certain range observation that various according time

lec "3"

[1] Mode → Most frequently, highest frequency → may not exist
→ used for qualitative data
→ not practically useful with the metric continuous
→ requires no calculation just counting
→ It isn't necessarily be unique

[2] Median → It is the middle value in ordered data → may existed
→ odd No → we have just one median
→ even No → " " 2 median

Characteristics → unique, not affected by 2 extremes & skewness
" " " outliers
it discard a lot of information why?

$$Md = \frac{n+1}{2}$$

[3] Mean → easy to handle
→ always exist & unique
disadvantage → affected by skewness & outliers & 2 extremes
→ It can't be used with the ordinal data
→ It use all of the information in the data set
→ may produce a mean that is not very representative of the general mass data

$$\bar{X} = \frac{\sum X}{N}$$

[4] weighted mean → It is the average measure of a No. of means

$$W.mean = \frac{w_1 \bar{X}_1 + w_2 \bar{X}_2 + \cdots}{w_1 + w_2 + \cdots}$$

* median & mode can be used for both ordinal & data
* mean can't be used for ordinal & Nominal
* Metric discrete mean & median & mode ✓
* Metric continuous mean & mode ✗

Lec "4"

1 Range

→ simplest , It is the distance from the smallest to largest
→ best written (from – to)
→ The range is not affected by skewness
→ " " " affected of an outlier value
→ give no idea about other observation just to 2 observation
→ It is not very useful measure of variation -

2 Interquartile range (iqr)

→ one solution to the proplem of the sensitivity to extreme value

→ measure the variation
→ standard deviation

→ The spread of the middle 50% of the distribution
→ together with the median is useful adjunct (accessory) to the range
→ it is less sensitive to the size of the sample
→ not affected either by outlier or skewness
→ It does not use all of the information in the data

3 standar deviation (SD)

→ it is the square root of the average square deviation of observation from the mean in a set of data
→ It use all the information in the data
→ It is depend on the unit of measurement, we can't compare between two or more data to overca[me] this

$$*SD = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{N}}{N-1}}$$

4 variance S^2

→ It is the average of squared deviation of observation from the mean in a set data
→ It's unit sequare so restor the squared unit into it's original form by taking the $\sqrt{\ }$ → SD

$$S^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{N}}{N-1}$$

lec "8"

① NDC homogenous form → 50% half of them higher than the mean / 50% half of them lesser
is symmetrical

② divided by → measure of CT → mean $\bar{X}$ → Divided the area
→ measure of variability → SD

كلما قل S.E كلما أقترب ىنّ M.

SD & it's multiplicity ← * divide the area into small areas
→ one SD
→ two SD
→ three SD
→ contain certain & fixed proportion

Characteristics NDC

① Bell shaped
② Symmetrical
③ unimodal
④ fixed proportion of the observation
⑤ $\bar{X}$, median, mode the same
⑥ All the medical, biological phenoma following it's distribution 68% 99% 95%
⑦ Area under curve divided by mean 2 equal halves

Importance
① It's for justification (تبرير)
② & calculation fo confidence Intervale
③ basis of most of significance testing

Different samples → differ $\bar{X}_s$ even if the samples size are equal

---

There is a difference between sample means & population, ~~mean~~ parameters called sampling error

There is a difference between sample means & population means

Samples mean $\bar{X}$ population mean μ

Average of SD sample means from population mean which is standard Error

كيف طلعت هيك !!

90% CI → 1.64, 1.65 How?

= .90
= .9
(confidence level)

① $A = \frac{1 + CI}{2} = \frac{1 + .90}{2} = .95$ → ①

منا الجدول

موجودة عند القيمة العمودية 1.6

و " " الأفقية 0.05, 0.04

okay? yes

② $1.6 + 0.04$
$+0.05$
$= 1.64, 1.65$

Done ?!

95% CI → 1.96 How?

= .95 okay? yes

① $A = \frac{1 + CI}{2} = \frac{1 + .95}{2} = 0.975$ → ①

برضو منا الجدول =

موجودة عند القيمة العمودية 1.9

" " " الأفقية 0.06

② $1.9 + 0.06$
$= 1.96$

Done ✓

99% CI → 2.58, 2.57

= .99

$= \frac{1 + CI}{2} = .995$ → $2.5 + 0.07$ (منا القيم العمودية) (منا القيم الأفقية)
$+ 0.08$
$= 2.58, 2.57$ Done

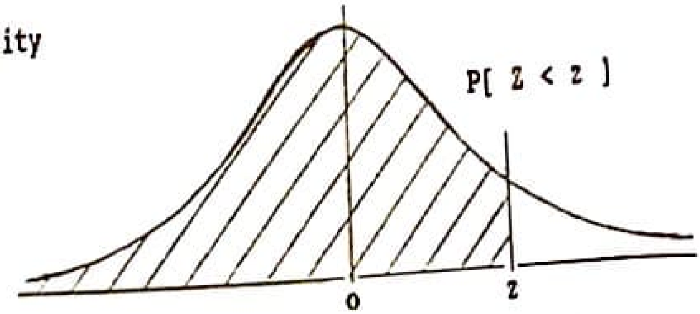
STANDARD STATISTICAL TABLES

1. Areas under the Normal Distribution

The table gives the cumulative probability up to the standardised normal value z
i.e.

$$P[\,Z < z\,] = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} \exp(-\tfrac{1}{2}Z^2)\, dZ$$

توضيح ل آخر ورقة♥



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5159	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7854
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8804	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
90% 1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
95% 1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9773	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9865	0.9868	0.9871	0.9874	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9924	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
99% 2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9980	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.998

z	3.00	3.10	3.20	3.30	3.40	3.50	3.60	3.70	3.80	3.9
P	0.9986	0.9990	0.9993	0.9995	0.9997	0.9998	0.9998	0.9999	0.9999	1.000