25/01/25

Day-7

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* Agenda

1. p-value & Significant value
2. Distribution
3. Central limit theorem
4. Bernomial Distribution
5. Binomial Distribution
6. Pareto's distribution
7. Log Normal distribution (Power law)

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* p-value & Significant
→ Derive the p-value

Q-1 The average weight of all residents in bangalore city is 168 pounds with a standard deviation 3.9. we take a sample of 36 individuals and the mean is 169.5 pounds. CI. 95%.

$\mu = 168$ $\sigma = 3.9$ $\bar{x} = 169.5$

$n = 36$ $\alpha = 0.05$ Z-test ?

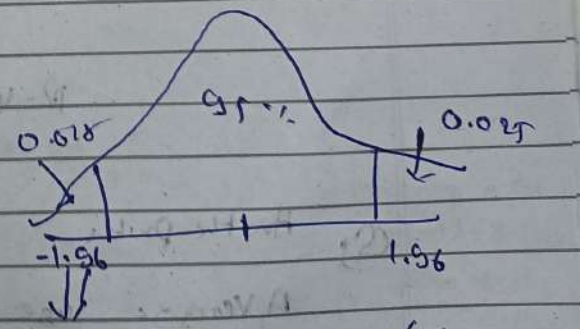
Ans:-

1. $H_0 = \mu = 168$

   $H_a = \mu \neq 168$

2. $\alpha = 0.05$

3. decision boundary



$1 - 0.25 = 0.975$ (Check in 2 tails)

Z test

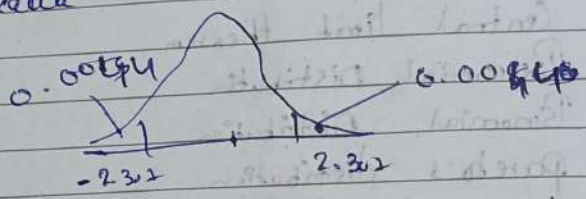
$$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{169.5 - 168}{3.9/\sqrt{36}} = \frac{1.5}{3.9} \times 6$$

$= 2.307$

* Decision rule

$Z = 2.302 > 1.96$ Reject the Null hy

p value



Now, we check 2 tail :- 0.9911

$= 1 - 0.9911 = 0.0089$

P value $= 0.0089 + 0.0089$

$= 0.0178$ //

p-value $= 0.0044 + 0.0044$

$= 0.0088$

p-value < 0.05

$0.0088 < 0.05$ // $\rightarrow$ Reject the Null hypothesis

p value $\leq$ Significant value

//

Reject Null hypothesis.

p-value $\geq$ Significant val

//

Fail to Reject the Null hypothesis

accept the null hy

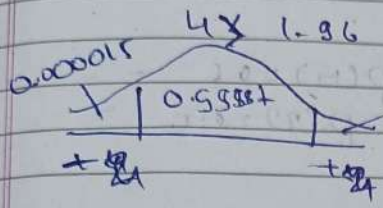
Q) Another Prob

Average age of a college 24 years with a Standard deviation 1.5. Sample of 36 students mean is 25 years $\alpha = 0.05$ (I 95%. do the age vary ?

Another Ex: $H_0 = \mu = 24$ $\sigma = 1.5$ $\bar{x} = 25$

$H_1 = \mu \neq 24$ $n = 36$ $\alpha = 0.05$

$$\frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{25-24}{1.5} \times 6 = \frac{6}{1.5} = 4$$



Reject Null hypothesis

Now,

$1 - 0.99997$

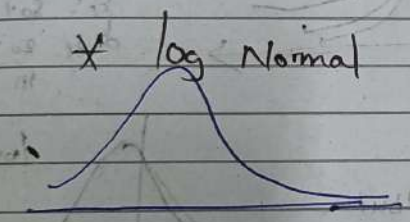
$= 0.00003$

P value $= 0.000015 + 0.000015$

$= 0.00003$

P value $\leq$ Significance { Reject the Null hypothesis }

* log Normal distribution



Ex: Wealth Distri

if

y Random variable it's belongs to log Normal distr

if i apply log(y) $\longrightarrow$ Normal distribu

* Bernoulli's distribution:

2 outcomes < 0 (or) 1

$p = 0.7$

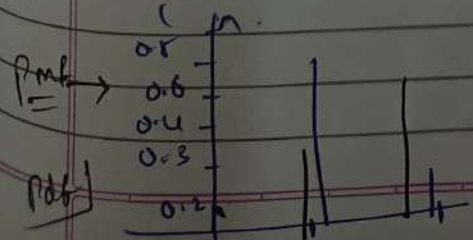
$q = 1 - p = 0.5$

Tossing a coin $P(H) = 0.5 \rightarrow p$

$P(T) = 1 - p = 0.5$

Donut have fair coin $P(-1) = 0.3 \rightarrow p$

$P(7) = q = 1 - 0.3 = 0.7$



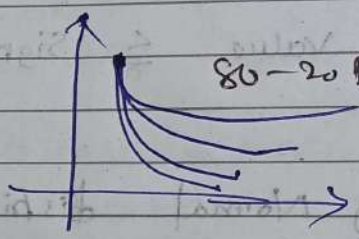
Probability mass function

* Binomial Distribution

Every → Binomial distribution
Multiple trail
↓
$p(H) = 0.5$ $p(H) = 0.6$ - - - -
$p(T) = 0.5$ $p(T) = 0.4$ - - - -

* Pareto distribution

- Pareto distribution it is not a non-gaussian distrib



Eg: 80% work done by 20% People

Eg: 80% of population distr 20% of people in a team