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Hypothesis Testing

① Null Hypothesis	② Alternate Hypothesis
→ well accepted / default	→ Opposite to H_0
→ Represented by H_0	→ Represented by H_A
$H_0 \rightarrow T_1$ & T_2 (Same)	$H_A \rightarrow T_1$ & T_2 (not same)
$\mu_1 = \mu_2$	$\mu_1 \neq \mu_2$

Eg:-
Consider a pharma company is working in India & it want to launch a new Drugs in India, we want check whether it will succeed or not.
Population :- want to survey on
→ How many no. of people using that Drugs or not

Steps

① Population :- group of people want to survey
Sample :- parts of Population

Hypothesis [Claim that says it's True]
① Null (H_0)
② Alternative (H_A)

Now, Same company launch New Drugs & they want to find whether this new Drugs will work or not., so we will do Hypothesis

① Null Hypothesis
Consider old Drugs 20% ~~was~~ used in population & we are assuming New one will also work ~~as~~ with 20% used then it's says that Null Hypothesis

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is True, As $H_0 = H_1$

Otherwise its Alternative Hypothesis only one Hypothesis will remain at a time

$H_0 \neq H_1$

Test to determine Null Hypothesis is accept or Not
1) X^2 test (chi)
2) t - Student test
3) Fisher z test

Level of Significance (α) [5% 1%]
— Confidence (c) [95% 99%]
$\alpha + c = 1$

A random sample of ~~50~~ items gives the mean 6.2 and variance 10.24. Can it be regarded as drawn from normal population with mean 5.4 at 5% level of significance.

$\bar{x} = 6.2$, $\sigma = 10.24$, $n = 50$

Null Hypoth. $H_0 = \mu = 5.4$

Alternative Hypoth. $H_A = \mu \neq 5.4$

Test statics

$$z = \left| \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \right| = \left| \frac{6.2 - 5.4}{10.24/\sqrt{50}} \right| = 1.77$$

$z = 1.77$.

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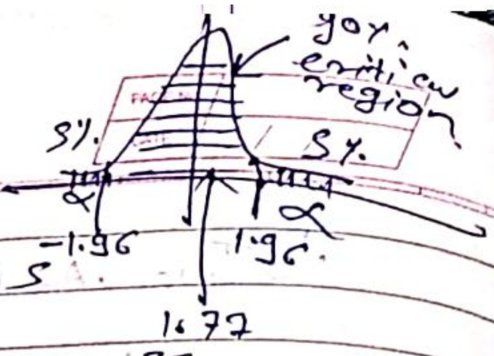


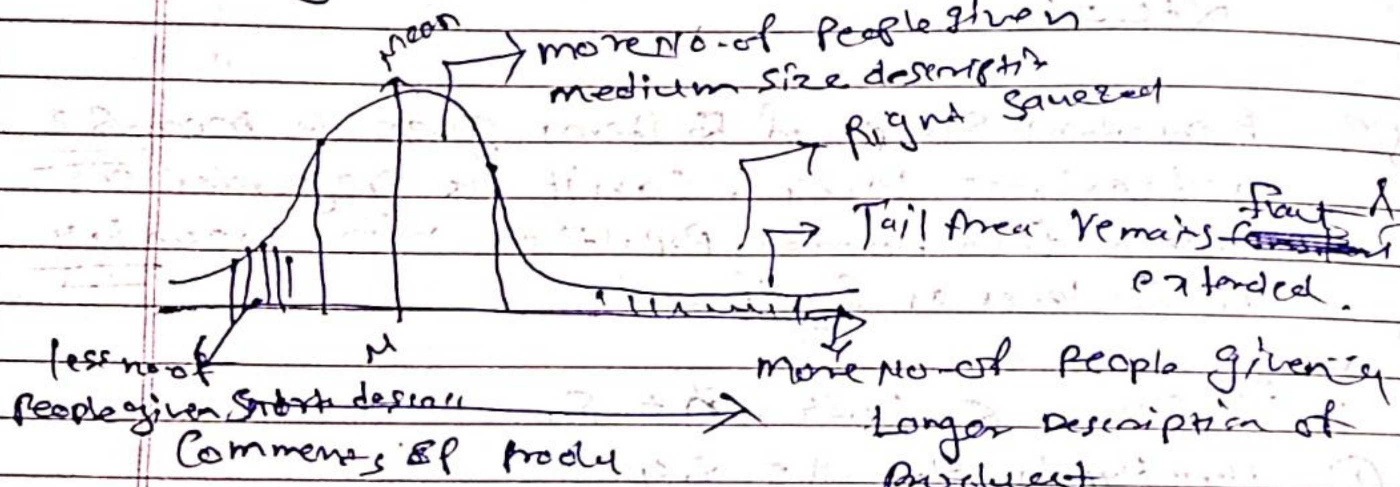
(4) Level of Significan. $\alpha = 0.05$

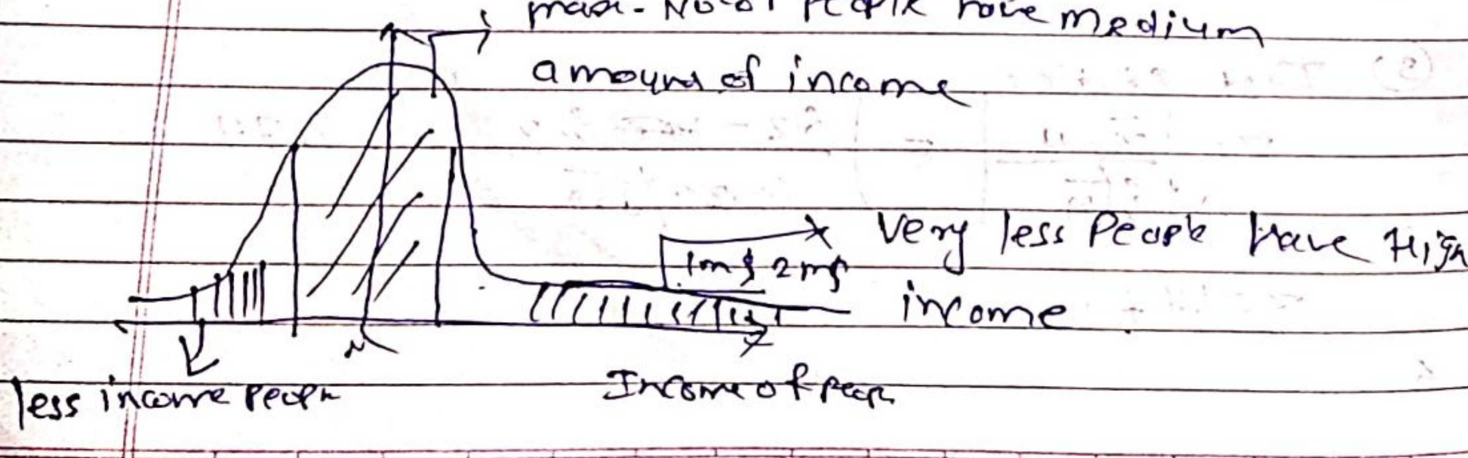
(5) Critical value:
if $\alpha = 0.005$ then $z = 1.96$

(6) Decision
$1.77 < 1.96$

So Null Hypothesis is accepted.

Log Normal Distribution.





Std. Normal Distri $\Rightarrow \mu = 0, \sigma = 1$

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→ Random variable

$X \sim$ Log Normal Distribution

if Log (x) is Normaly Distributi. [$\ln(x) \sim N(\mu, \sigma)$]

$X = \{x_1, x_2, x_3, \ldots x_n\}$

$\log(x) = \{\ln(x_1), \ln(x_2), \ln(x_3) \ldots \ln(x_n)\}$

Why we learn Distributio.

Eg:-

Medicatin Expense → Convert to Log Normal → Gaussian Distri

15,000 → $\ln(15000) \sim N(\mu, \sigma)$

16,000 → $\ln(16,000) \sim$

17,000 → $\ln(17,000) \sim$

18,000 → $\ln(18,000) \sim$

⇒ SND $\left[\frac{x_i - \mu}{\sigma}\right]$ Stnd. Normal Distrib.

All values will be scale down.

So due to this accuracy of model increase.

Whole Process known as LogNormalisatio, Model Accuracy will be increased.

$$\text{Variance} = \frac{1}{n} \sum_{i=1}^{n} (x_i - \mu)^2$$

μ → ~~[illegible]~~ mean

You can't Build a Time Series model, until your Time series Stationary.

$y = 140_1 \; 140_2 \; 140_3 \; 90 \; 165$

Stationary → probility of Set of values repeat over the Time.

Joint probability of a Series doesn't Change over time - mean & Variance remain Constant over time.

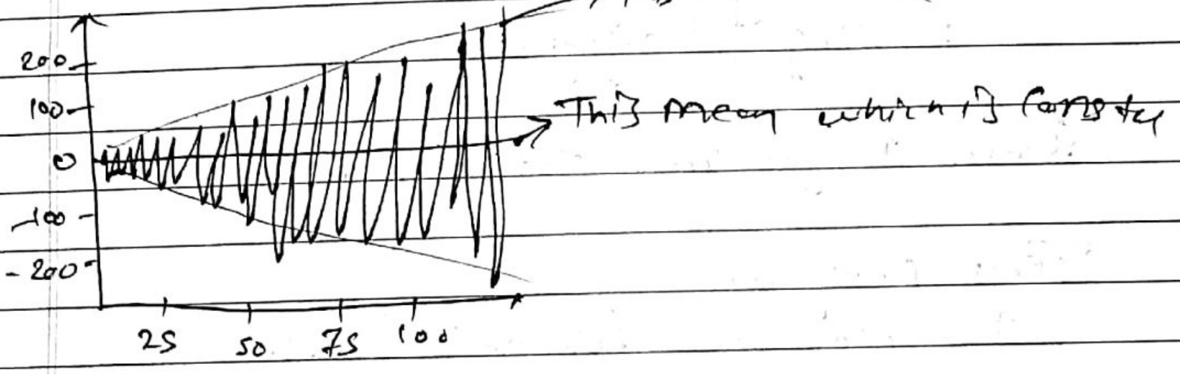
No trend in the Series

→ K is period

$F(Y_t) = F(Y_{t+K})$

F is a joint probability distribution

known as Strict probability.



Mean Stationary Process

- Constant mean
- Constant Variance
- Constant Auto Covariance → Its Covariance between two diff timepoints between Same Series

→ y is the Series

$y_t \; y_{ts}$.

↳ Covariance between Same Variable with lags.

Auto(t_1, t_2) = Auto(t_3, t_4) = Auto(t_5, t_6)