

Bayesian Estimation :-

Posterior dist
$$\mu_1 = \frac{n\bar{x}\sigma_0^2 + M_0\sigma^2}{n\sigma_0^2 + \sigma^2}$$

$$\sigma_1 = \sqrt{\frac{\sigma_0^2 \sigma^2}{n\sigma_0^2 + \sigma^2}}$$

Where n - sample size

M_0, σ_0 = prior values (dist)

\bar{x} = sample mean

s = std. dev of sample

Use s as σ .

Bayesian Interval to μ :-

$(1-\alpha)100\%$ Bayesian interval for μ is

$$\left(\mu_1 - z_{\alpha/2} \cdot \sigma_1, \mu_1 + z_{\alpha/2} \cdot \sigma_1 \right)$$

A professor's feeling abt the mean mark in the final examination in probability of a large group of students is expressed subjectively by normal distribution with $M_0 = 67.2, \sigma_0 = 1.5$ find the posterior mean, $\mu_1, s.d \sigma_1$ if examinations are conducted on a random sample of 40 students yield mean 74.9, $s.d = 4.4$ also determine the interval of the mean mark for 95% confidence level.

Sol:

$M_0 = 67.2$

$\mu_1 = ?$

$\mu_1 = 71.98$

$\sigma_0 = 1.5$

$\sigma_1 = ?$

$\sigma_1 = 0.92$

$n = 40, \bar{x} = 74.9, \sigma = 4.4$

(70.14, 73.78).

UNIT - 3

TESTING OF HYPOTHESIS

Procedure for testing of hypothesis of single mean:-

Step 1: Null Hypothesis, $\mu = \mu_0$;
(const)

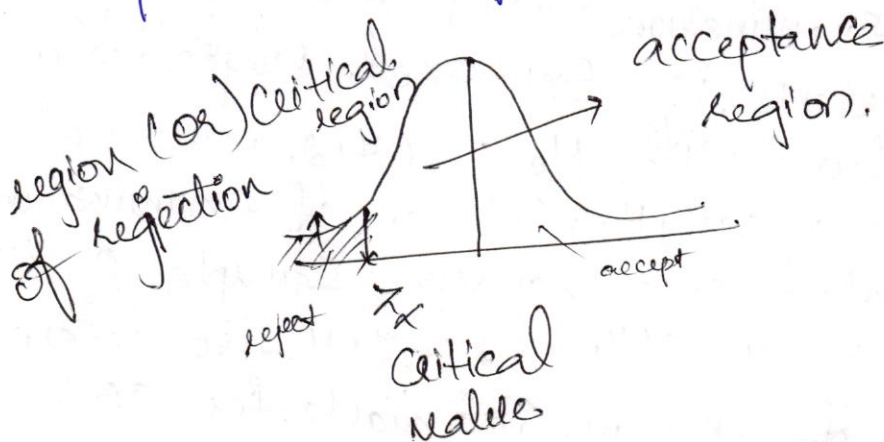
Step 2: Alternate Hypothesis i) $\mu < \mu_0$
ii) $\mu > \mu_0$ iii) $\mu \neq \mu_0$.

Step 3: Level of significance = α

Step 4: Test Statistic, $Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ (cal. value)

Step 5: conclusion / decision.

If $|Z_{cal}| < Z_{\alpha, tab}$. The result is not significant
or we accept Null Hypothesis.



Note: If alternate hypothesis is less than
type re (i) then it is called Z type
Left one-tailed test.

→ If alternate hypothesis is $>$ type then it is called right one tailed test

→ If alternate hypothesis is \neq type then it is called Two tailed test.

For ^{critical test} small samples and σ unknown
 Test statistic, T : $t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$ at $\mu = n - 1$ dof ^(use)
 $s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$

Problems: A lady stenographer claims that she can take dictation at a rate 120 words/min can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words/min with σ of 15 words.

Sol: $\mu = 120$ words/min $\mu \neq 120$
 $n = 100$ $\bar{x} = 116$ $\sigma = 15$

$\alpha = 5\% = 0.05$, $Z_{\alpha} = Z_{0.05} = 1.645$

$$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

Given that $\frac{116 - 120}{15/\sqrt{100}}$

$$Z = -2.66$$

Here A.H is \neq type
 \therefore It is two tailed test

