CSE-407

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Ans. to the ques. no.- 04

For, P-value calculation:

Here,

Null Hypothesis, $H_0 : \mu \leq 50.1$

Alternate Hypothesis, $H_1 : \mu > 50.1$

Also given,

$n = 10$

$$\bar{x} = \frac{49.8 + 47.6 + 50.2 + 47.4 + 50.3 + 44.5 + 47.9 + 48.5 + 45.5 + 50.18}{10}$$

$= 48.188$

$$s = \sqrt{\frac{(49.8-48.188)^2 + (47.6-48.188)^2 + (50.2-48.188)^2 + (47.4-48.188)^2 + (50.3-48.188)^2 + (44.5-48.188)^2 + (47.9-48.188)^2 + (45.5-48.188)^2 + (50.18-48.188)^2 + (48.5-48.188)^2}{(10-1)}}$$

$$= \sqrt{\frac{8.599 + 0.346 + 4.05 + 0.621 + 4.46 + 13.60 + 0.081 + 0.097 + 7.22 + 3.96}{9}}$$

$= 2.029$

$\alpha = 1 - C$

$= 1 - 0.95$

$= 0.05$

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It's a Right tailed test and since σ is unknown and $n \ngtr 100$ so we will use t - table.

Here,

$\alpha = 0.05$

from the ttable critical value is = 1.833

and, $z = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{48.188 - 50.1}{2.029/\sqrt{10}}$

$= -2.98$

For, -2.98 corresponding area is = 0.0014

So, p-val for, H_1 ; 0.0014 = 0.0014

Since, $0.0014 < 0.05 \ (\alpha)$

So, we reject Ho.

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For. Power of test calculation:

$c = 0.95$. So, $\alpha = 0.05$

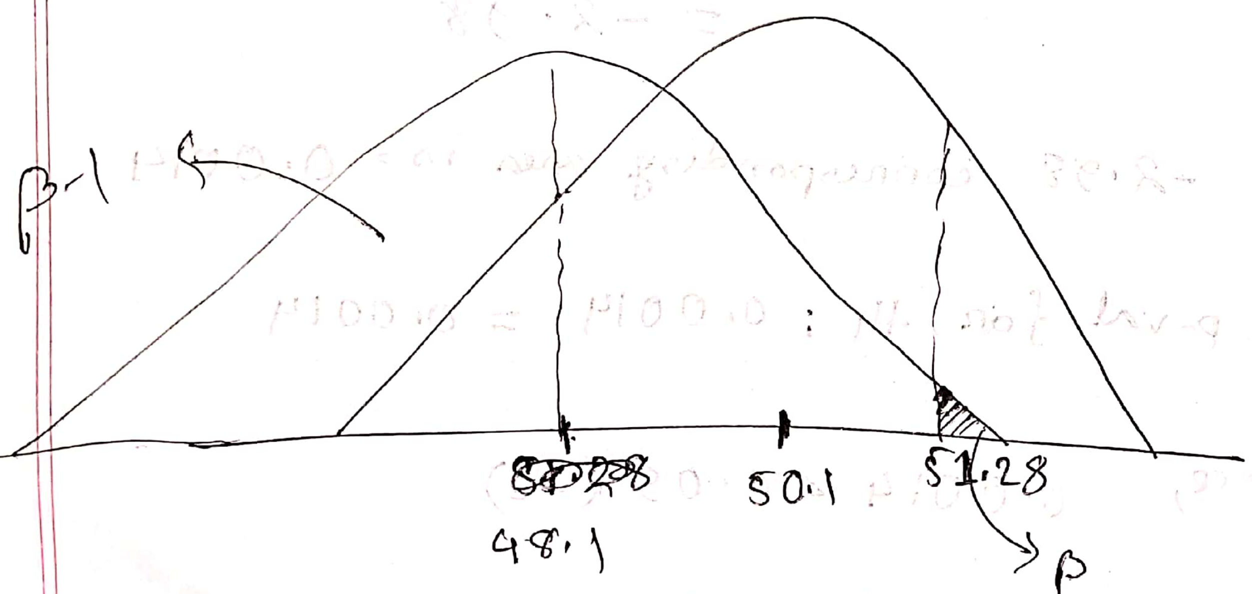
critical value for $0.05 = 1.833$

we will calculate $\bar{x}$ such that it will reject H_0.

$$\bar{x} = \mu_0 + \frac{s}{\sqrt{n}} z$$

$$= 50.1 + \frac{2.029}{\sqrt{10}} (1.833)$$

$$= 51.28$$



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$P(\bar{x} < 51.28 \mid \mu = 48.1)$ or,

$P\left(z < \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}\right) = P\left(z < \frac{51.28 - 48.1}{2.029/\sqrt{10}}\right)$

$= P(z < 4.956)$

$\beta = 0.0005$ $\quad = 0.0005$ (t-table)

So, power of test $= 1 - \beta$

$= 1 - 0.0005$

$= 0.9995$

So, 99.95%

(Ans)

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Ans. to the ques. no.-03

P-value in terms of probability can be defined as "How probable it is that H_1 is something". We can also say it does my sample data and test data convince me to accept/reject H_0?".

so, p-value =

(1) Probability of H_1 happening +

(2) Probability of same as H_1 happening +

(3) Probability of other (rarer) as H_1 happening

An example of P-value could be the worst case of covid-19 vaccine where the vaccine loses to a "placebo" effect just from ~~the~~

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hoping the worst data. So, ~~bu~~ if we used p-value we can easily say that rigidity of this scenario doesnot agree with our distribution. So, we need a new curve.

Ans. to the ques. no.- 02

I think, type II error is beyond the limit of the ~~data~~ analyst/researcher. Reason is, we can choose α but for β it depends on many things So, we implicitly cannot control β. as β depends on α, μ, n and σ/s. from that we can find β

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But we can not determine β.

~~that~~ Since, β in a measure of Type-II error. we can say that, type II error is beyond the control of researcher and to limit β we can adjust n, μ, α and σ/s, ~~too~~.

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Ans. to the ques. no.-01

types of error in hypothesis testing can be :

(1) type I error

(2) type II error

type I error is rejecting the Ho where Ho is actually true. and type II error is accepting the Ho where, Ho is actually false.

Lets assume the thief example :

where,

$H_0 : \mu =$ person is innocent

$H_1 : \mu =$ person is not innocent (thief)

So,

type I error is : Saying innocent person is regarded as thief.

type II error is : saying the thief as a Loyal person.