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Tutorial - 4

(1) $\mu_0 : \mu = 8$ vs $= \mu_1 : \mu \neq 8$, $\alpha = 0.01$

$n = 50$, $\bar{x} = 7.8$, $\sigma = 0.5$

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{7.8 - 8}{0.5/\sqrt{50}} = -2.82$$

$$z_{1-\alpha/2} = z_{0.995} = 2.575 \text{ and}$$

$$-z_{1-\alpha/2} = -z_{0.995} = -2.575$$

$$z > 2.575 \text{ or } z < -2.575$$

Sing $z = -2.83 \in R.R \rightarrow$ we reject H_0 at $\alpha = 0.01$

2 The trucking firm wants evidence that the claim is wrong i.e., that $\mu < 28\,000$. This is designated as H_α. The complementary statement is designated as H_0. Thus the hypotheses to the tested are —

$H_0 : \mu \geq 28000$ vs $H_\alpha : \mu < 28000$

$\alpha = 0.01$

$$z = \frac{27463 - 28000}{\frac{1348}{\sqrt{40}}}$$

$$z_\alpha = z_{0.01} = -2.326$$

There is sufficient evidence to doubt the trucking firm's claim.

3 $\bar{X} = 9.3,\ \mu = 8.9,\ s = 1.6,\ n = 50$

(i) Null hypothesis $(H_0) : \mu_1 = \mu_2$

Alternate Hypothesis $(H_\alpha) : \mu_1 \neq \mu_2$

(ii) Test statistic

$$z = \frac{\bar{X} - \mu}{s/\sqrt{n}} = \frac{9.3 - 8.9}{1.6\sqrt{50}} = 1.7678.$$

(iii) Level of significance at 5%, i.e., $\alpha = 5\%$ or $\alpha = 0.05$

(iv) Critical Value ⇒ The value of z_α at 5% level of significance from the table is 1.96.

(v) Decision: Since the computed value of $|z| = 1.7678$ is less than the critical value $z_\alpha = 1.96$, the null hypothesis is accepted.

$$z < z_\alpha$$

∴ The claim is acceptable at 5% LOS

Here given

$n = 64$

$\bar{x} = 1038$

$s = 146$

$\alpha = 0.05$

Hypothesis is,

$H_0 : \mu = 1000$

$H_a : \mu > 1000$

Here $\alpha = 0.05$ & the test is right tailed test

$\therefore t_c = 1.669$

we reject H_0 if $t > 1.669$

Test statistics,

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{1038 - 1000}{146/\sqrt{64}}$$

$\therefore t = 2.082$

Here $t > 1.669$

we reject the null hypothesis

we accept the alternative hypothesis $H_a : \mu > 1000$

(5) $\bar{x} = 2000$

$s = 200$ $\qquad \mu = 1950$

$n = 100$

$$z = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{2000 - 1950}{200/\sqrt{100}} = 2.5$$

at $\alpha = 0.05$, $z = 1.96$

Since $z = 2.5$ doesn't liew b/w -1.96 & 1.96

So,

this sample didn't come from those whose mean life-time in 2000 hrs.