DAMT

CSE : 5301-002

Assignment -5

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① $\mu = 1.73$

$\sigma = 0.2$

$n = 30$

$\alpha = 0.05$

Step 1: Hypothesis

$H_0: \mu = 1.73$ → Null hypothesis

$H_1: \mu > 1.73$ → Alternate hypothesis

One-tailed test

Step 2: Significance value

$z_{0.05} = \phi^{-1}(0.95) = 1.645$

Step 3: random chance

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{1.714 - 1.73}{\frac{0.2}{\sqrt{30}}} = -0.45653$$

Step 4: Decision

$-0.45653 < 1.645$,

∴ Null hypothes is accepted & alternate hypothesis is rejected.

Hence we can conclude that average height is not increased in last 10 years.

② Method A

$\mu = 7$

$\sigma = 3$

Method B

$\bar{X} = \frac{122}{15} = 8.134$

$\sigma = 3.31375$

$n = 15$

Step1 : Hypothesis

$H_0 = \mu = 7$ → Null hypothesis

$H_1 = \mu \neq 7$ → alternate hypothesis

∴ Two-tailed test

Step 2 : Significance Value.

$\alpha = 0.01 \quad \frac{\alpha}{2} = 0.005$

$\phi(z_{0.005}) = \phi^{-1}(1-0.005) = \phi^{-1}(0.995) = 2.57$

Step3 : random Chance probability.

$z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{8.134 - 7}{\frac{3}{\sqrt{15}}} = 1.46312$

Step 4: Decision. 1.46312 doesnot fall in rejection region. Hence Null hypothesis is maintained.

∴ Method B is better than A.

(3)

$\mu = 3.65$

$\sigma = 0.38$

$n = 10$

$\bar{x} = 3.76$

$\alpha = 0.05$

Step 1 : Hypothesis

$H_0 : \mu = 3.65$ → Null hypothesis

$H_1 : \mu \neq 3.65$ → alternate hypothesis

Two Tailed Test.

Step 2 : Significance Level.

$\alpha = 0.05 \rightarrow \frac{\alpha}{2} = 0.025$

$\phi^{-1}(z_{0.025}) = \phi^{-1}(1-0.025)$

$= 1.96$

Step 3 : random chance probability.

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{3.76 - 3.65}{\frac{0.38}{\sqrt{10}}} = 0.91539$$

Step 4 : Decision → Since 0.91539 does not fall in rejection, null hypothesis is retained.

(4) $\mu = 16$

$\sigma = 5.8$

$n = 10$

$\bar{x} = \frac{\Sigma x}{n} = \frac{167.8}{10} = 16.78$

$\alpha = 0.05$

Step1: hypothesis

$H_0: \mu = 16$ → Null hypothesis

$H_1: \mu < 16$ → Alternate hypothesis

Step2: Significance Level

$\phi^{-1}(z_{0.05}) = \phi^{-1}(1-0.05) = \phi^{-1}(0.95)$

$= 1.645$

Step3: random chance probability

$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{16.78 - 16}{\frac{5.8}{\sqrt{10}}} = 0.42527$

Step4: Decision

$0.42527 < 1.645$

∴ Null hypothesis retained.