Vidyalankar Institute of Technology
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Type-7 Example-1

A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cm. Can it be reasonably regarded that, in the population the mean height is 165 cm, and S.D. is 10 cm? $\mu = 165$?

Solution: - By Given Sample Size, n=100, Sample Mean $\bar{x} = 160$

Population Mean $\mu = 165$ S.D. of population, $\sigma = 10$

Since problem is of two tailed test we use following hypothesis

H_0: $\mu = 165$

H_1: $\mu \neq 165$

∵ Sample size is large therefore we use large sample test i.e. z-test

Therefore We use the formula

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{160-165}{10/\sqrt{100}} = -5$$

$\therefore |z| = 5$

$z_\alpha = z_{5\%=1.96}$

$|z| > z_\alpha$

∴ H_0 is Rejected ∴ H_1 is accepted

Therefore $\mu \neq 165$

∴ **We can conclude that Population mean is not equal to 165**

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Type-7 Example-2

A sample of 900 items is found to have a mean of 3.47 cm. Can it be reasonable regard as a sample from a population with mean is 3.23 cm. and S.D. 2.31 cm? μ= 3.23?

Solution: - By Given Sample Size, n=900, Sample Mean $\overline{x} = 3.47$

Population Mean μ= 3.23 S.D. of population, σ=2.31

Since problem is of two tailed test we use following hypothesis

H_0: μ= 3.23

H_1: μ≠ 3.23

∵ Sample size is large therefore we use large sample test or z-test

Therefore We use the formula

$$z = \frac{\overline{x}-\mu}{\sigma/\sqrt{n}} = \frac{3.47-3.23}{2.31/\sqrt{900}} = 3.12$$

$\therefore |z| = 5$

$z_\alpha = z_{5\%=1.96}$

$|z| > z_\alpha$

∴H_0 is Rejected ∴ H_1 is accepted

∴ We can conclude that Population mean is not equal to 3.23

3) A sample Of 100 students is taken from a large population. The mean height of the students in this sample is 160 cm. Can it be reasonably regarded that, in the population the mean height is 165 cm, and S.D. is 10 cm?

4) A sample of 400 observations has mean 95 and S.D 12. Could it be a random sample from a population with mean 98?

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Type-8 Example-1

The purpose of a study by klesges et al. was to investigate factors associated with discrepancies between self-reported smoking status and carboxyhemoglobin levels. A sample of 3918 self-reported non-smokers had a mean carboxyhemoglobin levels of .9 with a S.D. of **.96**. We wish to know if we may conclude that a population mean is less than 1.0

Solution: - By Given Sample Size, n=3918, Sample Mean $\overline{x} = 0.9$,

Standard deviation of sample is s=0.96, and Population Mean μ= 1

Since problem is of one tailed test we use following hypothesis

H_0: μ= 1

H_1: μ< 1

∵ Sample size is large therefore we use large sample test and in problems standard deviation of population is not given so we are using standard deviation of sample

Therefore We use the formula

$z = \frac{\overline{x}-\mu}{s/\sqrt{n}} = \frac{0.9-1}{0.96/\sqrt{3918}}$=**-6.52**

$\therefore |z| = 6.52$

$z_{\alpha} = z_{5\%=1.645}$

$|z|>z_{\alpha}$

∴H_0 is Rejected ∴ $H_1$is accepted

μ< 1

∴ **We can conclude that Population mean is less than 1**

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Type-8 Example-2

A research team is willing to assume that systolic blood pressure in a certain population of males is approximately normally distributed with S.D. of 16. A simple random sample of 64 males from the population had a mean systolic blood pressure reading of 133.at the 5% LOS .Do these data provide sufficient evidence for us to conclude that the population mean is greater than 130?

Solution: - By Given Sample Size, n=64, Sample Mean $\overline{x} = 133$,

Population Mean μ> 130?, but in actual solving problem take μ=130, and

Standard deviation of the population is σ=16

Since problem is of one tailed test we use following hypothesis

H_0: μ= 130

H_1: μ> 130

∵ Sample size is large therefore we use large sample test Therefore We use the formula

$$z = \frac{\overline{x} - \mu}{\sigma/\sqrt{n}} = \frac{133-130}{16/\sqrt{64}} = 1.5$$

$\therefore |z| = 1.5$

$z_\alpha = z_{5\%=1.645}$

$|z| < z_\alpha$

∴ H_0 is accepted

μ= 130

∴ We cannot conclude that Population mean is greater than 130

H.W.

1) We wish to know if we conclude that the mean daily caloric intake in the adult rural population of a developing country is **less** than 2000. A sample of 500 had a mean of 1985 and S.D. of 210. (α = .05 Z = 1.59)

3) A survey of 100 similar-size hospitals revealed a mean daily census in the paediatrics service of 27 with S.D. of 6.5. Do these data provide sufficient evidence to indicate that the population mean is **greater** than 25? (α=.05 Z = 3.076