ONE SAMPLE Z-TEST

This test is used to compare a sample mean ($\bar{x}$) to a population mean (μ) or to determine a confidence interval for a population mean ***when σ is known***

The cellulose content of a variety of alfalfa hay is normally distributed with $\sigma = 8$mg/g. An agronomist believes the cellulose content is higher than 140 mg.

Test this claim at the α = .05 significance level.

To test the claim, an SRS of 15 cuttings is taken with an average cellulose content is 145 mg/g.

P) STATE POPULATION PARAMETER:

μ = mean cellulose content of a variety of alfalfa hay

H) STATE HYPOTHESES:

$H_0 : \mu = 140$ $H_a : \mu > 140$

A) VERIFY CONDITIONS REQUIRED FOR TEST:

a) SRS

The problem states an SRS was used…

b) Sampling distribution normal- normal population or large sample size ($n > 40$) or justification for normality ($n < 40$) after omitting outliers

Since the population distribution is normal, the sampling distribution is normal

c) $N > 10n$

$N > 10n > 10(15) > 150$?

T) PUT DATA INTO LIST (IF NECESSARY) AND

a) USE TABLE C:

i) Determine mean ($\bar{x}$)

$\bar{x} = 145$

ii) Calculate *z* statistic

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = 2.42$$

iii) Determine critical z* and compare to z statistic

From Table C ($\alpha = .05$), the critical z* value is 1.645. Since 2.42 > 1.645, the P-value < .05.

b) USE CALCULATOR

STATS ---> TESTS ---> 1: Z-Test ---> P-value = .0077

DISTR ---> 1:normalcdf (min, max) = (2.42, 10) = .0078

S) STATE CONCLUSION:

At $\alpha = .05$ significance level, we reject the null hypothesis and conclude that the mean cellulose content of this variety of alfalfa hay is greater than 140 mg/g.

CONFIDENCE INTERVAL (Use PAIS):

A 90% confidence interval for the mean cellulose content of this variety of alfalfa hay is:

STAT ---> TESTS ---> 7:Z Interval = (141.6, 148.4)

We are 90% confident that the average cellulose content of this type of alfalfa hay is between 141.6 mg/g and 148.4 mg/g.