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Math 1320

MidTerm R Project

PROBLEM  
Cadmium, a heavy metal, is toxic to animals. Mushrooms, however, are able to absorb and accumulate cadmium at high concentrations. The Czech and Slovac governments have set a safety limit for cadmium in dry vegetables at 0.5 part per million (ppm). M. Melgar et al. measured the cadmium levels in a random sample size 12 of the edible mushroom Boletus Pinicola and published the results in the paper “Influence of Some Factors in toxicity and Accumulation of Cd from Edible Wild Macrofungi in NW Spain”.

Here are the data:

0.24, 0.59, 0.62, 0.16, 0.77, 1.33, 0.92, 0.19, 0.33, 0.25, 0.59, 0.32

At the 5% significance level do the data provide sufficient evidence to conclude that the mean cadmium level in Boletus Pinicola mushrooms differ than the government’s limit of 0.5 ppm?

PART1

Assume that population standard deviation is known and equal to 0.37 ppm and so apply One Mean-z test through R.

NULL HYPOTHESIS

ALTERNATIVE HYPOTHESIS

The data from the problem was entered into the R console and assigned to the x value.

Afterwards, a script I prepared for the math was loaded into R

> x <- c(0.24, 0.59, 0.62, 0.16, 0.77, 1.33, 0.92, 0.19, 0.33, 0.25, 0.59, 0.32)

> source('~/git/school/UMSL/MATH1320/midProject.R')

Next, a function for the one mean z-test was executed. Below are the findings

> oneMeanZTest(x)

Here's the data that was given:

0.24 0.59 0.62 0.16 0.77 1.33 0.92 0.19 0.33 0.25 0.59 0.32

##Given Values##

Population Standard deviation: 0.37

Significance Level: 5 %

Population Mean: 0.5

##Calculated Values##

Sample Mean: 0.5258333

Standard Error: 0.1068098

#trials: 12

Z-Score: 0.241863

Z-Interval: 0.2093434

Z-alpha/2: 1.959964

Confidence intervals (95%): (0.31649 , 0.7351767 )

RESULT

Based on the information from the R calculations, we will NOT reject the null hypothesis. The data does not provide sufficient evidence to prove the population mean does not equal 0.5.

PART 2

Assume that population standard deviation is unknown and sample standard deviation must be used as an estimate to population standard deviation and so apply One Mean-t test through R.

> oneMeanTTest(x)

Here's the data that was given:

0.24 0.59 0.62 0.16 0.77 1.33 0.92 0.19 0.33 0.25 0.59 0.32

One sample t-test

Data variable: dataValues

Descriptive statistics:

dataValues

mean 0.526

std dev. 0.352

Hypotheses:

null: population mean equals 0.5258333

alternative: population mean not equal to 0.5258333

Test results:

t-statistic: 0

degrees of freedom: 11

p-value: 1

Other information:

two-sided 95% confidence interval: [0.302, 0.75]

estimated effect size (Cohen's d): 0

RESULT

Based on the information provided, we will NOT reject the null hypothesis. The information provided does not prove that the sample population mean does not equal 0.526