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Statistics Package Exercise: Conducting a Hypothesis Test for the Population Mean: t test

Learning Objective: Carry out hypothesis testing for the population proportion and mean (when appropriate), and draw conclusions in context.

The purpose of this activity is to give you guided practice in the process of a t-test for the population mean and to teach you how to perform this test using statistical software.

Background:

A group of 75 college students from a certain liberal arts college were randomly sampled and asked about the number of alcoholic drinks they have in a typical week. The file containing the data is linked below. The purpose of this study was to compare the drinking habits of the students at the college to the drinking habits of college students in general. In particular, the dean of students, who initiated this study, would like to check whether the mean number of alcoholic drinks that students at his college have in a typical week differs from the mean of U.S. college students in general, which is estimated to be 4.73.

- R
- StatCrunch
- TI Calculator
- Minitab
- Excel

R Instructions

To open R with the data set preloaded, right-click here and choose "Save Target As" to download the file to your computer. Then find the downloaded file and double-click it to open it in R.

The data have been loaded into the data frame

The data have been loaded into the data frame

```
drinks
```

. Enter the command

```
drinks
```

to see the data. The variable in the data frame is

```
drinks.per.week
```

.

To use R to perform a t-test for the population mean using our data and the designated alternate hypotheses, enter the command:

- ```
  t.test(drinks$drinks.per.week,mu = 4.73, alternative = "two.sided")
  ```

R returns all the information you need to complete your t-test, including:

- The sample mean (mean of x)
- The t-test statistic of the sample (t)
- The degrees of freedom (df) (one less than the sample size)
- The alternative hypothesis
- The p-value of the test (p-value)
- A confidence interval (default is 95%; see note)

Note: Using R, the possible values for the alternative hypothesis are

```
"less"
```

,

```
"greater"
```

, and

```
"two.sided"
```
```

, corresponding to the three types of alternative hypotheses in a t-test. If

```
"two.sided"
```

is the alternative, then the appropriate confidence interval is returned. If

```
"less"
```

or

```
"greater"
```

is the alternative, then the returned confidence interval is what is known as a *one-sided confidence interval*, which we have not discussed.

Learn By Doing (1/1 point)

State the test statistic, interpret its value and show how it was found.

Your Answer:

t = -1.8275 and I used R!!!! Hahahaha

It means that the sample mean was 1.82 standard deviations below the mean.

(In seriousness: the formula that was mentioned previously and used in the previous exercise.)

Our Answer:
RStatCrunch TI CalculatorMinitabExcel R Here is the R output: The test statistic, t = -1.83, is calculated as follows: The sample mean is 1.83 standard errors below the null value. StatCrunch Here is the StatCrunch output: The test statistic is: 3.93333 - 4.7337 = -1.83 The sample mean is 1.83 standard errors below the null value. TI Calculator Here is the output: The test statistic is: The sample mean is 1.83 standard errors below the null value. Minitab Here is the Minitab output: The test statistic is: The sample mean is 1.83 standard errors below the null value. Excel Using Excel, we find: x-bar: 3.933 s: 3.775 We already know that μo = 4.73 and n = 75 from reading the problem statement, so we can calculate t: What this tells us is that the sample mean is 1.83 standard errors below the null value.

Resubmit Reset

Learn By Doing (1/1 point)

Based on the p-value, draw your conclusions in context.

Your Answer:

p-value = 0.07165; this means that there was a 7% probability of getting a sample mean -1.8275 standard deviations below the population mean, and so not statistically significant.

Our Answer:

RStatCrunch TI CalculatorMinitabExcel R The p-value is 0.072, which at the 0.05 significance level indicates that the results are not significant. The data, therefore, do not provide enough evidence to reject Ho and conclude that the mean number of alcoholic drinks that students at the college consume in a typical week is different from 4.73, the mean of college students in general. StatCrunch The p-value is 0.072, which at the 0.05 significance level indicates that the results are not significant. The data, therefore, do not provide enough evidence to reject Ho and conclude that the mean number of alcoholic drinks that students at the college consume in a typical week is different from 4.73, the mean of college students in general. TI Calculator Here is the output: The p-value is .072, which at the .05 significance level indicates that the results are not significant. The data, therefore, do not provide enough evidence to reject Ho and conclude that the mean number of alcoholic drinks that students at the college consume in a typical week is different from 4.73, the mean of college students in general. Minitab Here is the Minitab output: The p-value is .072, which at the .05 significance level indicates that the results are not significant. The data, therefore, do not provide enough evidence to reject Ho and conclude that the mean number of alcoholic drinks that students at the college consume in a typical week is different from 4.73, the mean of college students in general. Excel Using the TDIST function in Excel, we find that the p-value is .071, which at the .05 significance level indicates that the results are not significant. The data, therefore, do not provide enough evidence to reject Ho and conclude that the mean number of alcoholic drinks that students at the college consume in a typical week is different from 4.73, the mean of college students in general.

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