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Statistics Package Exercise: Checking Conditions for the Two-Sample t-test

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Statistics Package Exercise: Checking Conditions for the Two-Sample t-test

Learning Objective: In a given context, carry out the inferential method for comparing groups and draw the appropriate conclusions.

The purpose of this activity is to give you guided practice in checking whether the conditions that allow us to use the two-sample t-test are met.

Background

A researcher wanted to study whether or not men and women differ in the amount of time they watch TV during a week. In each of the following cases, you'll have to decide whether we can use the two-sample t-test to test this claim or not.

1. A random sample of 400 adults was chosen (191 women and 209 men). At the end of the week, each of the 400 subjects reported the total amount of time (in minutes) that he or she watched TV during that week.

-  **StatCrunch**  **TI Calculator**  **Minitab**  **Excel**

R Instructions

If you feel that you need to look at the two samples using histograms, you can open R with the data set preloaded by right-clicking here and choosing "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

```
tv2
```

. The two variables in the data frame are

```
time.men
```

and

```
time.women
```

.

Create two histograms to view the men's and women's data by modifying the following commands to add appropriate labels/titles.

- ```
hist(tv2$time.men)
```

- ```
hist(tv2$time.women)
```

Learn By Doing (1/1 point)

Can we use the two-sample t-test to test this claim?

Your Answer:

Yes because they were indeependently sampled, and the sample sizes are large enough even though they aren't of normal distributions.

Our Answer:

(i) Since the 400 subjects were chosen at random, we can assume that the two samples are independent. (ii) Since the sample sizes (191 and 209) are large, we can proceed with the two-sample t-test regardless of whether the populations are normal or not (and, thus, there is no need to look at the data using a histogram). In conclusion, we can reliably use the two-sample t-test in this case.

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2. A random sample of 50 married couples was chosen, which was split into a sample of 50 men and a sample of 50 women. At the end of the week, each of the 100 subjects reported the total amount of time (in minutes) that he or she watched TV during that week.

-  **StatCrunch**  **TI Calculator**  **Minitab** **Excel**

R Instructions

If you feel that you need to look at the two samples using histograms, you can open R with the data set preloaded by right-clicking here and choosing "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

```
tv4
```

. The two variables in the data frame are

```
time.men
```

and

```
time.women
```

.

Create two histograms to view the men's and women's data by modifying the following commands to add appropriate labels/titles.

- ```
hist(tv4$time.men)
```

- ```
hist(tv4$time.women)
```

Learn By Doing (1/1 point)

Can we use the two-sample t-test to test this claim?

Your Answer:

We cannot because they are not independently sampled samples!

Our Answer:

(i) This is a case where the two samples are not independent. Since each subject in one sample is linked (by marriage) to a subject in the other sample, these samples are dependent. The two-sample t-test is therefore not appropriate in this case.

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