

This final set of questions is to help you verify that you can use R to answer research questions that utilize the Wilcoxon Tests.

Consider the Duncan dataset in R. (Ensure `library(mosaic)` and `library(car)` is loaded.)

Filter the data set to just show "wc" and "prof" **types** of occupations. Then, create Q-Q Plots of prestige scores for (1) the professional and managerial occupations and (2) the white-collar occupations.

```
> library(car)
> qqPlot(prestige ~ type, data = ...)
```

Notice that the small sample size and potentially non-normal looking data suggests that a Wilcoxon Test is more appropriate than a t Test. Use an appropriate Wilcoxon Test that would answer the following question using the Duncan dataset in R.

Are prestige scores typically *higher* for professional and managerial occupations than for white-collar occupations?

Your Answer

Type of test: Wilcoxon Rank Sum (Mann-Whitney) Test ▼

Test statistic: 107

P-value: 0.0002293

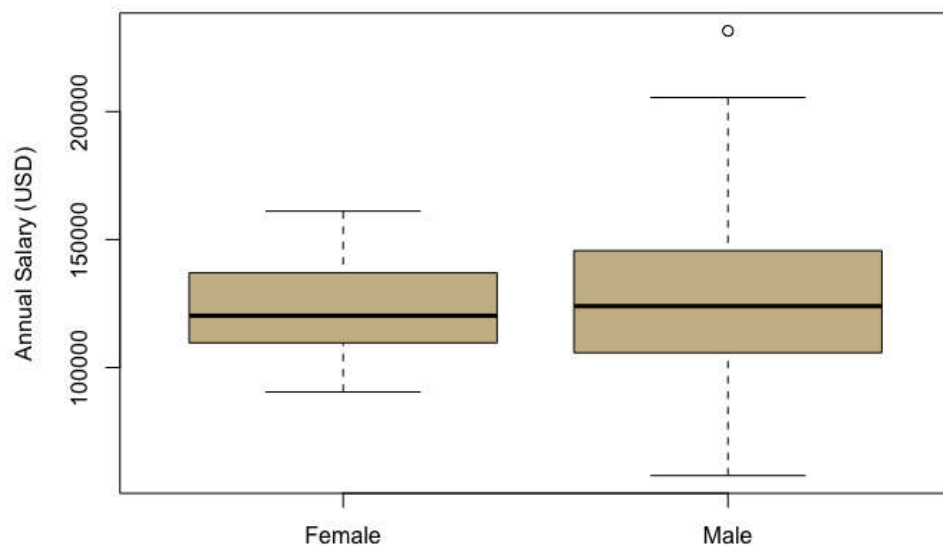
Conclusion: Reject the null. ▼

There is sufficient evidence to conclude that prestige scores are typically higher for professional and managerial occupations than for white-collar occupations. In other words, if you want to be prestigious, get a professional or managerial occupation.

Use the Salaries dataset in R. (Ensure the `library(mosaic)` is loaded.) Consider side-by-side box plots of salary according to gender for **just the professors**.

- ☒ I have been able to recreate a similar graph in R.
- ☐ I have not been able to reproduce this graph myself.

Do Male Prof's Earn Higher Median Wage?



The appropriateness of a Wilcoxon Test for equality of medians is questionable for these data because the distributions, while similarly shaped, do not appear to have the same spread. However, this is difficult to determine because the sample size for the females is 18, while it is 248 for the males.

What are the median wages, and sample sizes, for Male and Female **Professors**?

(Round answers to the nearest whole number.)

Professor	Median Annual Salary	Sample Size (n)
Male	123996	248
Female	120258	18

It is possible that we are seeing more extreme values with the males because we have more observations. However, a Wilcoxon Test for stochastic equivalence would still be appropriate (see the textbook Wilcoxon Tests page for details).

Run an appropriate Wilcoxon Test in R to determine if salary is stochastically different for one of the genders of professors. (The professors in this data will act as a representative sample for the population of professors from all universities.)

Your Answer

Type of test: Wilcoxon Rank Sum (Mann-Whitney) Test ▼

Test statistic: 2072

P-value: 0.6117

Conclusion: Fail to reject the null. ▼

There is insufficient ▼ evidence to conclude that salary is stochastically different for one of the genders of professors.

Use the Davis dataset in R. (Ensure the library(mosaic) and library(car) are loaded.)

Filter the data to be just for men.

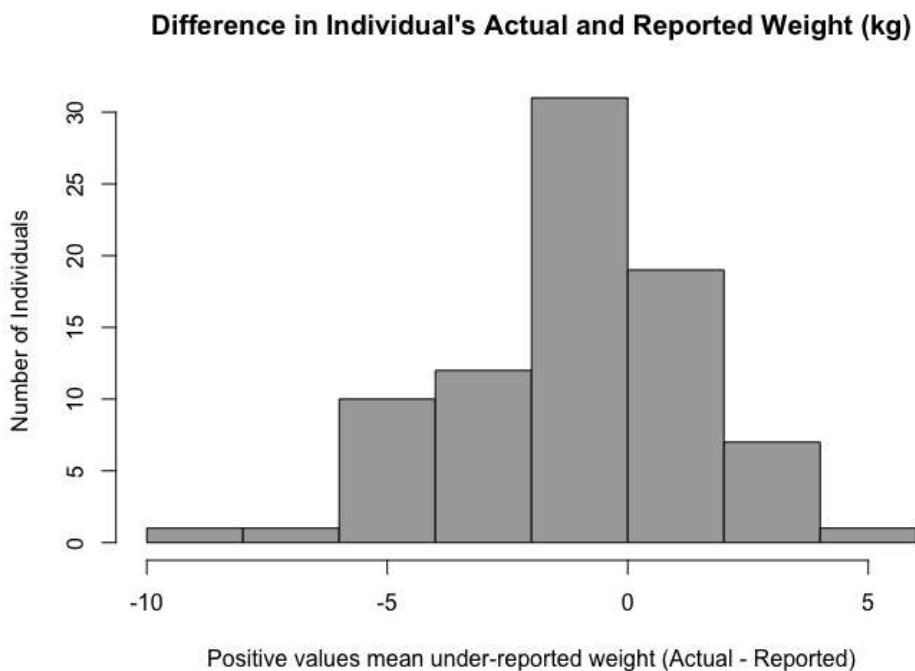
Use an appropriate Wilcoxon Test to decide if it is true that *men* who work out regularly over or under report their weight. (In other words, are men that work out regularly likely to report they weigh more or less than they actually do?) Let the null hypothesis be that the median of the differences in actual and reported weights are equal to zero. (Make sure the order is Actual - Reported weight.)

$$H_0 : \text{median of the differences} = 0$$

$$H_a : \text{median of the differences} \neq 0$$

Note: you should create a graphic of the differences to ensure that your test results are consistent with the pattern evident in the data. Recreate the graph shown below, or one similar.

- ☒ I have recreated the graph below.
- ☐ I have not been able to recreate this graphic.



Your Answer

Type of test: Wilcoxon Signed-Rank Test

Test statistic: 890.5

P-value: 0.08129

Conclusion: Fail to reject the null at the 0.05 level of significance. ▼

There is insufficient ▼ evidence to conclude that men who work out regularly under report their weight.