

Homework #3 (Hypothesis Testing - Interval/Ratio)
PSCI 2300 - Fall 2019 (Dr. Hensel)

This homework assignment is due at the beginning of class (i.e., before lecture starts) on **Friday, November 8**. Any work turned in after lecture begins that day (even if only a few minutes into class) will be assessed a late penalty. Also, note that all work must be your own -- students found to have copied their answers from other students (or to have had their answers copied by other students) will receive automatic zero grades on this assignment, and may face further disciplinary action.

Please type your responses to each question. Be sure to show your work wherever relevant; correct answers that do not show their work will only receive half credit.

This homework assignment requires you to analyze data on the 50 U.S. states compiled by the author of our textbook, which is available from the same portion of the class web site where you access the homework assignments. You will analyze this data using SPSS (or PSPP) statistical software. The last page of this homework assignment sheet provides instructions for using SPSS, and PSPP is usually very close to the same instructions and options.

Difference of Means Tests

1. Come up with a theoretical story (2-3 sentences) to explain the relationship you would expect to see between Southern and other states (the independent variable) and the percentage vote share for Hillary Clinton in the 2016 presidential election (the dependent variable).

2. What is the research hypothesis in your theoretical story (H_1), and what is the appropriate null hypothesis (H_0)?

3. Use SPSS (or PSPP) to run a difference of means test to determine whether or not there is a significant difference in **clinton16** ("Vote share for Clinton in 2016 election"), using the independent/grouping variable **south** ("Southern state?").

Be sure that your homework includes the full output from the T-test, including both the "Group Statistics" box (showing the mean, SD, and other summary information for each value of the independent variable) and the "Independent Samples Test" box (showing the results of the test).

4. Is the finding statistically significant? (Be sure to refer to the significance of the t-test for Equality of Means. If that produces a large F-statistic and a small p-value, use the t-test results that do not assume equal variances; otherwise, use the t-test results that assume equal variances.)

5. What do the results from this test tell you about your research hypothesis and null hypothesis? (Be sure to refer to the direction and apparent size of the observed differences between means, as well as the statistical significance of the t-test.)

Analysis of Variance (ANOVA)

6. Come up with a theoretical story (2-3 sentences) to explain the relationship you would expect to see between state voter ID laws (the independent variable) and the percent of eligible voters who turned out to vote in the 2016 presidential election (the dependent variable).

Note that the data set codes states into five categories of voter ID laws: (1) strict photo ID requirement, (2) strict non-photo ID requirement, (3) photo ID requested, (4) ID requested - photo not required, and (5) no ID document required to vote. Your theoretical story doesn't need to address all five of these; you can talk more generally about stricter or looser requirements.

7. What is the research hypothesis in your theoretical story (H_1), and what is the appropriate null hypothesis (H_0)?

8. Use SPSS (or PSPP) to run an analysis of variance (ANOVA) to determine whether or not there is a significant difference in **vep16_turnout** ("Percent turnout of voting eligible population"), using the independent/grouping variable **voter_id_law** ("Voter identification law in effect in 2017").

Be sure that your homework includes the full output from the ANOVA, including both the "Descriptives" box (showing the mean, SD, and other summary information for each value of the independent variable) and the "ANOVA" box (showing the results of the test).

9. Is the finding statistically significant?

10. What do the results from this test tell you about your research hypothesis and null hypothesis? (Be sure to refer to the direction and apparent size of the observed differences between means, as well as the statistical significance of the ANOVA.)

SPSS Instructions for This Assignment

- For more detail about using SPSS or PSPP, including links to online resources that give more details on how to use these methods and interpret their results, see my SPSS Guide document that is posted on the class web site.

<<http://www.paulhensel.org/Teaching/spss.pdf>>

- Download the data set that you will need for this assignment (perhaps to a flash drive if you are not working on your own personal computer) -- *please note that this is the same data set used for homework #2, so if you still have that available, you do not need to do any additional work to reacquire it.* From a computer that has SPSS or PSPP, open this data file, using one of the following two options:

- Double-click on the data set, which should automatically open SPSS and then open the data set in SPSS. [Note that this option does not appear to work in PSPP]

- Open SPSS manually by clicking on the icon or on an alias/shortcut to it. Once it is open, select and open the data set using **File > Open** from the menu bar at the top of the screen.

Difference of Means

- Go to **Analyze > Compare Means > Independent-Samples T Test**. This will open a dialog box that allows you to choose variables for analysis.

- Select the variable you want to examine (the dependent variable) on the left side of this box, push the arrow button toward the top of the screen, and the variable should then appear in the "Test Variable(s)" window at the right side of the box. Do the same to select the variable that you are using to identify groups for comparison (the independent variable), and push the button in the middle of the screen to select this for the "Grouping Variable" box. Then select the "Define Groups" button and list the two variables you want to compare (often group1=0 and group2=1, but if this doesn't work, you may need to run a variable frequencies command like you did for homework #2 to see the values of the variable) -- note that PSPP includes a dropdown arrow in the group selection boxes that will allow you to select the categories rather than having to enter their numbers manually. Once this is set, click Continue to return to the variable selection screen, and click OK to run the analysis. (If you want to remove a variable from the list, select the variable in the right side of the box, and click the arrow in the middle of the screen.)

- Once the output appears in the Output Viewer window, be sure to print it out (or copy and paste it into a word processing document), because you will need to turn this in to get full credit for your assignment.

ANOVA

- Go to **Analyze > Compare Means > One-Way ANOVA**. This will open a dialog box that allows you to choose variables for analysis.
- Select the variable you want to examine (the dependent variable) on the left side of this box, push the arrow button toward the top of the screen, and the variable should then appear in the "Dependent List" window at the right side of the box. Do the same to select the variable that you are using to identify groups for comparison (the independent variable), and push the button in the middle of the screen to select this for the "Factor" box. Click the "Options" box and be sure that "Descriptives" is checked, to make sure that you will get the means for each group (in PSPP there is a simple "Descriptives" checkbox on the main screen - you won't need to go to an Options screen); once everything is set, click OK to run the analysis. (If you want to remove a variable from the list, select the variable in the right side of the box, and click the arrow in the middle of the screen.)
- Once the output appears in the Output Viewer window, be sure to print it out (or copy and paste it into a word processing document), because you will need to turn this in to get full credit for your assignment.