Homework Exercise 5

COM (BA) Statistics - WS 2020

November 30, 2020

Due date: December 14, 2020
Max. points: 8

1. Using the *student questionnaire data* test the hypothesis that the average height of corporate communication students is different from the average height in the general population Austria. The average height of a person in Austria is 171 centimeters.

   (a) Formulate the null and alternative hypothesis for this research question.

   (b) Find an appropriate statistical method and test the hypotheses derived in (a) for a signficance level of $\alpha = 0.05$.

   (c) Interpret the results of the procedure chosen in (b).

2. Revisiting the first exercise in the previous homework (Homework 4), test the hypothesis that the *height* of students is associated with the *handspan* of students using the *student questionnaire data*.

   (a) Calculate the 80% confidence intervals for the parameters in the regression model.

   (b) Test the hypothesis using a null hypothesis significance testing procedure with the conventional significance level, $\alpha = 0.05$.

   (c) Are the results for the confidence interval and the hypothesis test equivalent? Justify your answer.

3. Test if the *handspan* of younger students is different from the *handspan* of their older collegues. Use the *student questionnaire data* to,

   (a) Calculate a binary variable, classifying students into two age groups. Students with an age below the median age in the sample should be assigned 0, and students with median age or above should be assigned 1.

   (b) Test the hypothesis that the means in the subpopulations is different at the significance level, $\alpha = 0.1$.

   (c) Fit the equivalent linear regression model to the data and compare the hypothesis test for the parameters to the result from the null hypothesis significance test in (b).

   (d) Interpret the test results from (b) and (c).

4. Using the calculated binary dummy variable for *age*, test if age is independent from the *sex* of students.

   (a) Calculate a binary variable for sex, indicating *female students* ($x = 1$) and *non-female* ($x = 0$) students.

   (b) Calculate the test statistic and make a test decision at the conventional significance level, $\alpha = 0.05$.

   (c) Test the assumptions for this null hypothesis significance test. Are the assumptions met?

SPSS hints:

- You can calculate a *one sample t-test* via `Analyze → Compare Means → One-Sample T Test`. The population mean under the null hypothesis μ_0 is called `Test Value` in SPSS.

- A *two sample t-test* is calculated by `Analyze → Compare Means → Independent-Samples T Test`.

- You can find the χ^2 test for independence in `Analyze → Descriptive Statistics → Crosstabs`. Select `Chi-square` in the settings menu `Statistics...` The test results of interest are given in the table row `Pearson Chi-Square`.

- For t-tests and regression parameters (coefficients), the test statistic of interest is provided in the output column `t`.

- *P-values* are provided in the output column `Sig.` or `Sig. (2-tailed)`.