

Homework Exercise 4

COM (BA) Statistics - WS 2020

November 23, 2020

Due date: December 7, 2020

Max. points: 8

1. Using the *student questionnaire data* fit a linear regression model to the data, predicting the *height* from the *handspan* of students.

- (a) Estimate the intercept and slope of the regression line and provide 95% confidence intervals for the estimates.

In SPSS: You can fit a linear regression via **Analyze → Regression → Linear**.

- (b) Check the assumptions of the regression model by creating a residual plot, displaying the fitted values against the residuals.

In SPSS: Save predicted values and residuals for plotting using the **Save** functionality in the linear regression module.

- (c) Evaluate the goodness-of-fit of the regression model by calculating the coefficient of determination. Does the model do a good job of fitting the data?

- (d) For a handspan of 20 centimeters, what is the 50% prediction interval? How is this interval interpreted?

In SPSS: You can create predictions for new values by adding the value as new data (leave other variables missing) and save predicted values using the **Save** functionality in the linear regression module.

2. Using the *student questionnaire data* fit a linear regression model to the data, estimating the sex difference in *handspan*.

- (a) Create a new dummy coded variable which labels female students as 1 and 0 otherwise.
- (b) Estimate the group difference in handspan and provide 80% confidence intervals for the estimates. What are the estimated means for female and non-female students?
- (c) Evaluate the goodness of fit for the model using the residual standard deviation. How is the residual standard deviation interpreted for this model?

In SPSS: The residual standard deviation is provided in the output table **Model Summary** as **Std. Error of the Estimate**.

- (d) If we were to predict values for the next student cohort, what are the intervals of handspans that contains 95% of new observations of female and non-female students?