

# Homework assignment

## L1: Introduction

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**Assignment date:** 06.10.2020

**Deadline:** 12.10.2020 23:59

**Course webpage:** <http://www.cs.cas.cz/martinkova/NMST570>

**Note:** Send answers and R script to [hladka@cs.cas.cz](mailto:hladka@cs.cas.cz) and [martinkova@cs.cas.cz](mailto:martinkova@cs.cas.cz) (in CC)  
Include NMST570 in subject of your e-mails

**Name:**

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### 1 Lecture presentation

Watch lecture presentation (online Zoom, or video shared on course webpage) and provide answer(s) to question(s) posed in the presentation. Note that the question slide is not included in the PDF file shared on course webpage.

### 2 Reading with Perusall

Create an account on Perusall and join class "Selected topics in Psychometrics". Provide at least 1 annotation in Czech or in English to assigned reading [1pt]. See

<https://perusall.com/downloads/scoring-examples.pdf>

### 3 Run selected R code

Download selected R code for Chapter 2 from

[https://github.com/patriciamar/psychometrics.intro/blob/master/Chapter2\\_MeasurementData.R](https://github.com/patriciamar/psychometrics.intro/blob/master/Chapter2_MeasurementData.R)

and run it.

### 4 ShinyItemAnalysis with toy data

Run the `ShinyItemAnalysis` application and try basic data exploration. Using the default dataset, answer following questions

1. What is the name of the dataset? (**Data**) [0.25pt]
2. Of how many items does the dataset consist of? (**Data**) [0.25pt]
3. How many observations does the dataset contain? (**Data**) [0.25pt]
4. How many observations do come from focal (females) and reference (males) group? (**Data**) [0.5pt]
5. What are the maximum and minimum values of the criterion variable? (**Data/Basic summary**) [0.5pt]

## 5 ShinyItemAnalysis with uploaded data

Upload and explore the LSAT7 dataset (Bock & Lieberman, 1970) which contains 5 dichotomously scored items obtained from section 7 of the Law School Admissions Test. Download the csv file from

[https://github.com/patriciamar/psychometrics\\_intro/tree/master/datasets/LSAT7](https://github.com/patriciamar/psychometrics_intro/tree/master/datasets/LSAT7)

1. Upload the data into the **ShinyItemAnalysis** application. Provide a proof (screenshot) [0.25pt]. Using uploaded data, answer the following questions.  
HINT: Use binary data type for upload.
2. What is the mean and the standard deviation of the total scores? (**Summary/Total scores**) [0.5pt]
3. Calculate the Z-score for a student with total score of 3 points. Provide the whole calculation. [1.25pt]  
(**Summary/Standard scores**)
4. Calculate the T-score for a student with total score of 3 points. Provide the whole calculation. [1.25pt]  
(**Summary/Standard scores**)
5. How many points did student on the 69th percentile receive? (**Summary/Standard scores**) [0.25pt]

## 6 Exercise in R

Create a short R script including the following tasks

1. Upload data from previous section [0.5pt] and explore it [0.5pt].  
HINT: Use function `data <- read.csv("LSAT7.csv")` to upload the data and for example `summary(data)`, `head(data)` and `dim(data)` to explore. What do these functions show?
2. Compute total scores for all respondents. Calculate mean, median, standard deviation, skewness and kurtosis of computed total scores. (**Summary/Total scores/Selected R code**) [0.5pt]
3. Draw a histogram of the total scores. Values smaller than median should be red, values larger than median should be blue, median should be gray. (**Summary/Total scores/Selected R code**) [0.75pt]
4. Are the total scores approximately normally distributed? Why/Why not? [0.5pt]
5. Compute the Z-scores for all respondents. (**Summary/Standard scores/Selected R code**) [0.5pt]
6. Compute the T-scores for all respondents. (**Summary/Standard scores/Selected R code**) [0.5pt]

## 7 Provide feedback

Here you can provide feedback on lecture, lab session and/or materials (slides, video presentation, HW assignment, **ShinyItemAnalysis** application, etc.) [1pt bonus] :)