# HW1 Quantitative Research Methods for IBS, due 17.1.2023 at 10:00

**Submit in Moodle. In questions 1 and 2 attach the SPSS output files (.spv) and answers to the questions. For question 3 prepare a short report where you have copied (or imported) relevant analyses and outputs from SPSS.**

**Question 1**

Consider the following small data which you can use for practicing data input to SPSS, and some bacic operations.

| Participant | Gender | Mathexam | College | Satquant |
|---|---|---|---|---|
| 1 | 1 | 24 | 1 | 570 |
| 2 | 1 | 18 | 2 | 450 |
| 3 | 2 | 34 | 1 | 600 |
| 4 | 2 | 27 | 2 | 450 |
| 5 | 1 | 15 | 1 | 580 |
| 6 | 1 | 26 | 1 | 550 |
| 7 | 1 | 42 | 2 | 480 |
| 8 | 2 | 25 | 1 | 520 |
| 9 | 2 | 31 | 1 | 450 |
| 10 | 2 | 44 | 2 | 550 |

The data set consists of 10 college students. The variables are

- Participant: ID-number, not used in analysis
- Gender: 1="male", 2="female"
- Mathexam: Score for entrance exam
- College accommodation: 1="home", 2="away"
- Satquant: The score for SAT quantitative test

**Tasks:**

a. Open a new SPSS file and type the data given above there.
b. Define variable names in SPSS. Give labels to the variables and define their values when it makes sense.
c. Which of the variables are quantitative, and which are categorical? Choose the corresponding measurement levels in SPSS for these variables as scale or nominal, respectively.
d. Run the case summaries for all these variables (**Analyze, Reports, Case Summaries).** Choose all the statistics available. Go through the list of statistics to identify which of them are familiar to you …
e. Choose Gender as a grouping variable and run the case summaries for the other three variables. What kind of information do you get from this type of analysis?
f. Now study Frequencies (**Analyze, Descriptive Statistics, Frequencies).** Choose all the statistics available and select charts, that make sense in each case.

g. Now run Descriptives (**Analyze, Descriptive Statistics, Descriptives).** Choose all the statistics available (from the **options** button). No graphs are available here.

h. Now run Explore (**Analyze, Descriptive Statistics, Explore).** Now choose from the Statistics button **Descriptives** and from the **Plots** button select **Box-plot, Stem-and-Leaf Diagram**, and **Histogram**.

i. With **Explore** study students' performance in Mathexam and Satquant using College as a **Factor.** What can you conclude?

j. Prepare a cross-tabulation of Gender and college accommodation (**Analyze, Crosstabs**). Choose one of them as a row variable and the other one as column variable. Try selecting percentages separately for columns, and then for rows from the **Cells** button. Interpret. Now choose percentages for the total. Interpret.

Also attach the data file for this question.

## Question 2

Let's study total compensation for the CEO's of 170 S&P 500 companies and the total shareholder return for their companies in 2012.

Open the Excel file **CEO-compensation.xlsx** (File, Open Data), where you have to select file type Excel. Save the file as an SPSS file **CEO-compensation.sav**. Let's now practice the Chart Builder (**Graphs, Chart Builder**).

a. First consider the variable Compensation.
   Prepare a **Histogram** from the lower panel and drag it to the upper panel. Drag the variable compensation to the X-axis of the upper panel. Press OK. What can say about the shape of the distribution.

b. Now Choose **Line** to draw a frequency polygon for compensation.

c. Now draw a **Box-plot** (choose the box on the right of the lower panel). From the Box-plot can you indicate, which company has given the highest compensation to their CEO. How many percentages higher that is compared to an average CEO?

d. Do a, b and c for the shareholder **return** in 2012. Answer the same questions.

e. Now prepare a scatter plot for the return and compensation. Does it appear that there is relationship between the return and the compensation?

**Question 3 (Case)**

**CardioGood Fitness**

CardioGood Fitness is a developer of high-quality cardiovascular exercise equipment. Its products include treadmills, fitness bikes, elliptical machines, and e-glides. CardioGood Fitness looks to increase the sales of its treadmill products and has hired The AdRight Agency, a small advertising firm, to create and implement an advertising program. The AdRight Agency plans to identify particular market segments that are most likely to buy their clients' goods and services and then locate advertising outlets that will reach that market group. This activity includes collecting data on clients' actual sales and on the customers who make the purchases, with the goal of determining whether there is a distinct profile of the typical customer for a particular product or service. If a distinct profile emerges, efforts are made to match that profile to advertising outlets known to reflect the particular profile, thus targeting advertising directly to highpotential customers.

CardioGood Fitness sells three different lines of treadmills. The TM 195 is an entry-level treadmill. It is as dependable as other Inodels offered by CardioGood Fitness, but with fewer programs and features. It is suitable for individuals who thrive on minimal programming and the desire for simplicity to initiate their walk or hike. The TM 195 sells for $1 ,500.

The middle-line TM498 adds to the features of the entry-level model two user programs and up to 15% elevation upgrade. The TM498 is suitable for individuals who are walkers at a transitional stage from walking to running or midlevel runners. The TM498 sells for $1,750.

The top-of-the-line TM798 is structurally larger and heavier and has more features than the other models. Its unique features include a bright blue backlit LCD console, quick speed and incline keys, a wireless heart rate monitor with a telemetric chest strap, remote speed and incline controls, and an anatomical figure that specifies which muscles are minimally and maximally activated. This model features a nonfolding platform base that is designed to handle rigorous, frequent running; the TM798 is therefore appealing to someone who is a power walker or a runner. The selling price is $2,500.

As a first step, the market research team at AdRight is assigned the task of identifying the profile of the typical customer for each treadmill product offered by CardioGood Fitness. The market research team decides to investigate whether there are differences across the product lines with respect to customer characteristics. The team decides to collect data on individuals who purchased a treadmill at a CardioGood Fitness retail store during the prior three months.

The team decides to use both business transactional data and the results of a personal profile survey that every purchaser completes as their sources of data. The team identifies the following customer variables to study: product purchased— TM195, TM498, or TM798•, gender; age, in years; education, in years; relationship status, single or partnered; annual household income ($); mean number of times the customer plans to use the treadmill each week; mean number of miles the customer expects to walWrun each week; and self-rated

fitness on a I-to-5 scale, where I is poor shape and 5 is excellent shape. For this set of variables:

A. Which variables in the survey are categorical?

B. Which variables in the survey are numerical?

C. Which variables are discrete numerical variables?

The market research team at AdRight is assigned the task to identify the profile of the typical customer for each treadmill product offered by CardioGood Fitness. The market research team decides to investigate whether there are differences across the product lines with respect to customer characteristics. The team decides to collect data on individuals who purchased a treadmill at a CardioGood Fitness retail store during the prior three months. The data are stored in the file CardioGoodFitness.xlsx. The team identifies the following customer variables to study: product purchased, TM 195. TM498, or TM798; gender; age, in years; education, in years; relationship status, single or partnered; annual household income (S): average number of times the customer plans to use the treadmill each week; average number of miles the customer expects to walk/ run each week; and self-rated fitness on an I-to-5 ordinal scale, where I is poor shape and 5 is excellent shape.

D. Create a customer profile for each CardioGood Fitness treadmill product line by developing appropriate tables and charts.

E. Write a short report to be presented to the management of CardioGood Fitness detailing your findings.