University of Applied Sciences Cologne
Faculty of Economics, Business Administration and Law
Prof. Dr. Arrenberg
Room 221, Tel. 39 14
jutta.arrenberg@fh-koeln.de

Exercises Quantitative Methods

Worksheet: Pearson Chi-Square Test

Example 1.1 (Anderson et. al., page 415)
One of the questions on the *Business Week* Subscriber Study was, „In the past 12 months, when travelling for business, what type of airline ticket did you purchase most often?". The data obtained are shown in the following contingency table:

	Type of flight	
Type of ticket	Domestic flight	International flight
First class	29	22
Business class	95	121
Economy class	518	135

Ticket_Flight.sav

Use $\alpha = 0{,}05$ and test for the independence of type of flight and type of ticket. What is your conclusion?

Reference: Anderson, Sweeney, Williams, Freeman, Shoesmith: Statistics for Business and Economics, Thompson Learning, London, 2007

Solution:

Rule of thumb is fulfilled with:

1. df=2
2. minimum expected count = 15.41
3. Zero cells have expected count less than five

p-value Chi-Square-Test $= 1.6 \cdot 10^{-22} < 0.05$;
this means the type of ticket depends on the type of flight.

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Example 1.2
Do young women and men strive for the same jobs?

Give an answer to this question by help of the following sample. In the year 1999 about 1 497 young persons have the following kinds of practical training:

Kind of Training	female	male
Industry and Trade	362	471
Handicraft	131	485
Public Service	30	18

Geschlecht_Ausbildungsbereich.sav

The abbreviations are as follows:

- i=Industry and Trade
- h=Handicraft
- ö=Public Service
- w=female
- m=male

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Example 1.3 (*Status_Father_Son.sav*)
Cross-classification of father's and his son's occupational status category (*Source: Advanced in Statistical Analysis, Volume 91, Number 3, 2007, page 271*):

Father's status category	Sons's status category (1)	(2)	(3)	(4)	(5)
(1)	64	51	26	30	6
(2)	18	102	51	18	6
(3)	6	48	138	24	11
(4)	35	82	107	112	13
(5)	30	140	279	106	306

(1) is Capitalist
(2) is New-Middle
(3) is Labor
(4) is Self-Support
(5) is Peasantry

Is there a relationship between a father's status and the son's status?

Example 1.4 (*Edu_Mother_Father.sav*)
Cross-classification of mother's and father's education for a sample of Afro-Americans (*Source: Advanced in Statistical Analysis, Volume 91, Number 3, 2007, page 271*):

Mother's education	Father's education (1)	(2)	(3)	(4)
(1)	81	3	9	11
(2)	14	8	9	6
(3)	43	7	43	18
(4)	21	6	24	87

(1) is 8th grade or less
(2) is Part high school
(3) is High school
(4) is College

Is there a relationship between the degree of education of the mother and the father?

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Example 1.5: (Exam 9^{th} February, 2010)
Please open the file *1991 U.S. General Society Survey.sav* of the SPSS-Tutorial. This is a poll of 1 517 US-Americans of age 18 up to 89.

a) Use the sample data to test for the independence of the two variables "race = Race of Respondent" and "happy = General Happiness".

   1. What is the name of the test?
   2. Which assumptions of the test must be checked to get an accurate result? Please verify these assumptions.
   3. Consider the p-value. What is your conclusion?

b) Does there appear to be a relationship between General Happiness and Number of Children? What does the result of your analysis tell the purchasing department?

c) Use $\alpha = 0.05$ and a goodness of fit test to see whether the data of the variable Number of Children fit a normal distribution.