**PSYCHOMETRICS**

**June, 2016**

**Final exam**

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**ID number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Exercise 1.** Given the following data matrix where letters are participants and numbers are items:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Items | | | |
| Participants | *1* | *2* | *3* | *4* |
| *A* | 1 | 1 | 1 | 1 |
| *B* | 0 | 1 | 1 | 0 |
| *C* | 0 | 1 | 1 | 1 |
| *D* | 1 | 1 | 1 | 1 |
| *E* | 1 | 1 | 0 | 0 |
| *F* | 0 | 0 | 0 | 0 |

1. Can we say that the participants’ answers fit Guttman’s model?
2. What is the scaling value of participant C?

**Exercise 2.** In the different options of three items of a test, we obtain the following percentages of response:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item | Correct option | Percentage of response | | | | |
|  |  | a | b | c | d | e |
| 1 | b | 16 | 40 | 15 | 14 | 15 |
| 2 | c | 35 | 15 | 21 | 17 | 12 |
| 3 | a | 60 | 1 | 21 | 18 | 0 |

For each item, argue what response alternatives work correctly or incorrectly.

**Exercise 3.** Calculate the reliability coefficient of:

1. A 50-item spatial reasoning test where the variance of the empirical scores is 100 and the sum of the variances of the items is 80.
2. A verbal reasoning test composed of 10 dichotomous items of equal difficulty, where the mean and standard deviation are 6.2 and 2.65 respectively.
3. A numerical reasoning test where the variance of the even items is 4, the variance of the odd items is 3 and the variance of scores in the full test is 10.

**Exercise 4.** A test aims to predict, when the academic year starts, the grade students are going to obtain in an entrance exam at the end of the academic year. The validity coefficient is 0.9. Regarding the entrance exam, we know that the standard deviation of the empirical scores was 2. What level of confidence should be used in the estimates for having a maximum error not greater than 1.5?

**Exercise 5**. We would like to know if the degree of knowledge on the subject and the degree of extraversion enhance the quality of teaching in professors. A sample of five professors was evaluated in knowledge (X1) and extraversion (X2). The correlation between knowledge and quality of teaching was 0.7; the correlation between extraversion and quality of teaching was 0.5; and the correlation between knowledge and extraversion was 0.8.

1. Calculate the coefficient of determination. Interpret the result.
2. Calculate the semipartial correlations. Interpret the results.