Solutions for Exam 2011, Problem 2

ANYM, 20190917

2.1 - 4

Four principal components account for 92.10 % of the variation

Theorem 6.3 and Remark 6.7

2.2 - 4

As the correlation matrix is used, we use the second test in teorem 6.8.

We have 10 eigenvalues, k = 10

We test the 7 smallest, m = 3

This yields:

$$\chi\left(\frac{1}{2}(k-m+2)(k-m-1)\right) = \chi\left(\frac{1}{2} \cdot 9 \cdot 6\right) = \chi(27)$$

2.3 - 4

To express a difference, we want the principal component to have different signs for left and right ankle. Further, it should have a large numerical value for both. With these criteria the answer is 'Prin8'

2.4 - 3

We refer to the definition of communalities on p. 404. The answer can then be read directly in the output: AnkL=0.965450

2.5 - 5

We refer to page 405. The factor weight gives the covariance between a factor and an original variable. Further we have assumed that the original variables have been standardized, i.e. V(X) = 1. That means that the covariance equals the correlation.

The factor weights can be read in the output under 'Factor pattern' and we find the largest for factor 1: 0.85747

2.6 - 1

Number 1 is the correct answer.