Solution to Exercise 7.4

We see that the correlation matrix corresponds to the matrix considered in exercise 1.1 with $\rho = 0.4$. From the solution to that exercise we get that the largest eigenvalue is

$$\lambda_1 = 1 + 2 \times 0.4 = 1.8$$

The fraction of the total variation explained by the first principal component is 1.8/3=0.6, i.e. 60% of the variation will be explained by the first principal component.

The corresponding eigenvector is

$$p_1 = \frac{\sqrt{3}}{3}\begin{bmatrix}1\\1\\1\end{bmatrix}$$

Therefore the first principal component will be proportional to the average of the 3 measures and thus represent a **general measure of dishonesty**.

See also remark 6.7 in the book.