Exercise 5.1

We consider realisations of independent, stochastic, normal variables X and Y, where the two empirical dispersion matrices, each based on 10 observations, are

$$S_X = \begin{bmatrix} 6 & -2 \\ -2 & 6 \end{bmatrix} \text{ and } S_Y = \begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$$

Furthermore we have the corresponding observed mean values

$$\bar{X} = \begin{bmatrix} 3 \\ 4 \end{bmatrix} \text{ and } \bar{Y} = \begin{bmatrix} 6 \\ 6 \end{bmatrix}$$

1. Find Hotellings T^2 based on the data above.

2. We assume that the underlying distributions for the X's and Y's in the two cases are the same. What is the probability of observing a more extreme value of T^2 than the one found in 1. I.e. what is the p-value for the test of $\bar{X} = \bar{Y}$?

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