WST 311

Assignment F: 19-28 March 2018

1. Work through Example B.

2. A shoe company evaluates new shoe models based on five criteria: style, comfort, stability, cushioning and durability, with each of the first four criteria evaluated on a scale of 1 to 10 and the durability criteria evaluated on the scale of 1 to 20. Based on the evaluations of 25 people about the company's latest prototype you have to determine whether the shoe is ready for release to the market. The goals expected from new products is that $\boldsymbol{\mu}$, the vector of average responses for each criteria, is equal to

$$\begin{pmatrix} \mu_{style} \\ \mu_{comfort} \\ \mu_{stability} \\ \mu_{cushioning} \\ \mu_{durability} \end{pmatrix} = \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{pmatrix} = \begin{pmatrix} 6 \\ 8 \\ 5 \\ 6 \\ 10 \end{pmatrix} = \boldsymbol{\mu}_0.$$

   The observed data is given in the file shoes.xls on ClickUP.

   Assume that the data comes from a multivariate normal distribution.

   (a) Calculate the correlation coefficient between Comfort and Stability. Also calculate the partial correlation coefficient between Comfort and Stability controlling for Durability.

   (b) Calculate the sample mean vector.

   (c) The hypothesis $H_0 : \boldsymbol{\mu} = \boldsymbol{\mu}_0$ must be tested on a 10% level of significance.

      i. Calculate Hotellings T^2 statistic, that is $\dfrac{T^2}{N-1}$.

      ii. Calculate the test statistics, that is $\dfrac{T^2}{N-1}\dfrac{N-p}{p}$.

      iii. Calculate the critical value for the hypothesis and use it to test the hypothesis.

      iv. Calculate the p-value for the hypothesis and use it to test the hypothesis.

      v. Give a conclusion in terms of the problem.