# Assignment on the Multivariate General Linear Model

We consider the multivariate general linear model given by

$$\begin{bmatrix} Y_1 & Z_1 \\ Y_2 & Z_2 \\ Y_3 & Z_3 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} \alpha & \gamma \\ \beta & \delta \end{bmatrix} + \begin{bmatrix} \epsilon_{11} & \epsilon_{12} \\ \varepsilon_{21} & \epsilon_{22} \\ \varepsilon_{31} & \epsilon_{32} \end{bmatrix}$$

and we want to test

$$H_0 : \delta = 0 \; versus \; H_1 : \delta \neq 0$$

**Problem 1.**

1. Find the **A**, **B**, and **C**-matrices used in Theorem 5.9, p 236.
   Hint:

$$\begin{bmatrix} 0 & 1 \end{bmatrix} \begin{bmatrix} \alpha & \gamma \\ \beta & \delta \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix} = \delta$$

**Problem 2.**

Let the observed values of the Y's and Z's be

$$\begin{bmatrix} -4 & 1 \\ 4 & -1 \\ 6 & 3 \end{bmatrix}$$

1. Find the test statistic for the test described above.

**Problem 3.**

1. What is the distribution of $\hat{\delta}$?
2. Compare the test statistic obtained in Assignment 2 with the t-test statistic you may find by considering the distribution of $\hat{\delta}$?

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