MAI0142
Hand in Problems – 4

1. Let

$$\boldsymbol{x}' = \boldsymbol{\beta}'\boldsymbol{C} + \boldsymbol{\varepsilon}, \qquad \boldsymbol{\varepsilon} \sim N_n(\boldsymbol{0}, \sigma^2\boldsymbol{V}), \quad \boldsymbol{V} \ p.s.d.$$

   and suppose that $\boldsymbol{\beta}'\boldsymbol{L} = \boldsymbol{0}$, for some known matrix $\boldsymbol{L}$. Estimate the parameters $\boldsymbol{\beta}$ and σ^2.

2. For each task presented below create three matrices: $\boldsymbol{A}_1$, $\boldsymbol{A}_2$ and $\boldsymbol{A}_3$.

   (i) Create the matrices such that $\mathcal{C}(\boldsymbol{A}_i)$ is orthogonal to $\mathcal{C}(\boldsymbol{A}_j)$, $i \neq j$.

   (ii) Create the matrices such that $\mathcal{C}(\boldsymbol{A}_i)$ is disjoint with $\mathcal{C}(\boldsymbol{A}_j)$, $i \neq j$, but not orthogonal.

   (iii) Create matrices such that

$$\mathcal{C}(\boldsymbol{A}_1) \cap \mathcal{C}(\boldsymbol{A}_2) = \{\boldsymbol{0}\},$$
$$\mathcal{C}(\boldsymbol{A}_1) \cap \mathcal{C}(\boldsymbol{A}_3) = \{\boldsymbol{0}\},$$

   but $\mathcal{C}(\boldsymbol{A}_1) \cap \mathcal{C}(\boldsymbol{A}_2 : \boldsymbol{A}_3) \neq \{\boldsymbol{0}\}$.