

Problem Set #7

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Discussed and/or compared answers with Sarah Bass, Emily Case, Katherine Kwok, Michael Nattinger, and Alex Von Hafften

Exercise 13.1

Exercise 13.2

Exercise 13.3

Exercise 13.4

- (a)
- (b)
- (c)
- (d)

Exercise 13.11

Exercise 13.13

- (a)
- (b)
- (c)
- (d)
- (e)

(f)

(g)

Exercise 13.18

Exercise 13.19

Exercise 13.28

(a)

(b)

(c)

Exercise 17.5

To show this statement, recognize that, since M_D is idempotent, the inequality can be reduced as follows:

$$\begin{aligned}\sigma_\varepsilon^2 \left(\sum_{i=1}^n \dot{X}_i' \dot{X}_i \right)^{-1} &\geq \sigma_\varepsilon^2 \left(\sum_{i=1}^n X_i' X_i \right)^{-1} \\ \left(\sum_{i=1}^n X_i' X_i \right) &\geq \left(\sum_{i=1}^n \dot{X}_i' \dot{X}_i \right) \\ \sum_{i=1}^n X_i' X_i &\geq \sum_{i=1}^n (M_D X_i)' (M_D X_i) \\ \sum_{i=1}^n X_i' X_i &\geq \sum_{i=1}^n (M_D X_i)' (M_D X_i) \\ \sum_{i=1}^n X_i' X_i &\geq \sum_{i=1}^n X_i' M_D X_i \\ \sum_{i=1}^n X_i' X_i &\geq \sum_{i=1}^n X_i' X_i - X_i' D (D' D)^{-1} X_i\end{aligned}$$

Where $X_i' D (D' D)^{-1} X_i$ is positive semi-definite.