Homework #4 (due October 25, 2012)

1. Let $\mathbf{X} = A\theta + \mathbf{e}$ where A is a known $n \times p$ matrix, θ a parameter and $\mathbf{e}$ $(n \times 1)$ vector of errors with zero mean and covariance matrix $\sigma^2 V$ with a known $V > 0$.
Find the (generalized) LSE of θ and show that it is BLUE.

2. Assuming in the setup of Problem 1 that $\mathbf{e} \sim N(0, \sigma^2 V)$, calculate the matrix of Fisher information in $\mathbf{X}$ about θ and find if the LSE is efficient.

3. Assuming in the setup of Problem 1 that the pdf of $\mathbf{e}$ is $f(\mathbf{x})$, find the matrix of Fisher information in $\mathbf{X}$ about θ in terms of f.