Stat873 **HW06**

For $Y = X\beta + \epsilon$, $\epsilon \sim N(0, \sigma^2\Sigma)$, $X \in R^{n\times p}$ has full column rank. $\theta = l'\beta \in R$ has BLUE $l'\widehat{\beta}$ where $\widehat{\beta}$ is the minimum norm $\text{GLSE}_{\Sigma^{-1}}(\beta)$.

1. Find $\sigma^2_{l'\widehat{\beta}}$, the variance of $l'\widehat{\beta}$.
2. Replacing parameters in the expression of $\sigma^2_{l'\widehat{\beta}}$ by their UEs one can get the estimated the variance of $l'\widehat{\beta}$, $S^2_{l'\widehat{\beta}}$. Find $S^2_{l'\widehat{\beta}}$.
3. It is known that $F(1,\, n-p) = [t(n-p)]^2$. Derive the relation of $F_\alpha(1,\, n-p)$ and $t_{\alpha/2}(n-p)$.
4. Express the $1-\alpha$ confidence interval for $\theta = l'\beta$ derived in the lecture using the cut-off point for $t(n-p)$ distribution and $S_{l'\widehat{\beta}}$.