MA329 Statistical linear models 20-21

Assignment 2 (Due date: Oct 18, 11pm. For late submission, each day costs 10 percent)

1. (10 marks) If $\boldsymbol{A}$, $\boldsymbol{B}$ and $\boldsymbol{A}+\boldsymbol{PBQ}$ are nonsingular, prove that

$$(\boldsymbol{A}+\boldsymbol{PBQ})^{-1}=\boldsymbol{A^{-1}}-\boldsymbol{A^{-1}PB}(\boldsymbol{B}+\boldsymbol{BQA^{-1}PB})^{-1}\boldsymbol{BQA^{-1}}$$

2. (15 marks) $\boldsymbol{A}=\begin{pmatrix}4&2&2\\2&2&0\\2&0&2\end{pmatrix}$

   (a) Find a symmetric generalized invese for $\boldsymbol{A}$;

   (b) Find a nonsymmetric generalized invese for $\boldsymbol{A}$.

3. (15 marks) Prove that $(\mathbf{X}'\mathbf{X})^{-}\mathbf{X}'$ is a generalized inverse of $\mathbf{X}$ for any generalized inverse of $\mathbf{X}'\mathbf{X}$.