Quantitative Method

Assignment 1

Due October 11, 2005

1. For the matrices $\mathbf{A} = \begin{bmatrix} 1 & 3 & 3 \\ 2 & 4 & 1 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 2 & 4 \\ 1 & 5 \\ 6 & 2 \end{bmatrix}$, compute $\mathbf{AB}$, $\mathbf{A}'\mathbf{B}'$, and $\mathbf{BA}$.

2. Evaluate the determinant of $\mathbf{D} = \begin{bmatrix} 2 & 1 & -3 & 1 \\ -3 & -2 & 0 & 2 \\ 2 & 1 & 0 & -1 \\ 1 & 0 & 1 & 2 \end{bmatrix}$

3. Calculate det($\mathbf{B}$), tr($\mathbf{B}$) and $\mathbf{B}^{-1}$ for $\mathbf{B} = \begin{bmatrix} 4 & 1 & -1 \\ 0 & 3 & 2 \\ 3 & 0 & 7 \end{bmatrix}$.

4. Find the inverse of $\mathbf{B} = \begin{bmatrix} 2 & 5 & 0 & 0 & 0 \\ 3 & 9 & 0 & 0 & 0 \\ 0 & 0 & 2 & -2 & -1 \\ 0 & 0 & 1 & 1 & -2 \\ 0 & 0 & 1 & 0 & -1 \end{bmatrix}$ if it exists.

5. Prove that tr($\mathbf{AB}$) = tr($\mathbf{BA}$) where $\mathbf{A}$ and $\mathbf{B}$ are any two matrices that are conformable for both multiplications. They need not be square.

6. For a square matrix $\mathbf{A}$, suppose that there is an $\mathbf{x} \neq \mathbf{0}$ such that $\mathbf{Ax} = \mathbf{0}$. Explain why $\mathbf{A}$ is singular.

7. Find the rank of $\left(\mathbf{1}_n(\mathbf{1}_n'\mathbf{1}_n)^{-1}\mathbf{1}_n'\right)$, where $\mathbf{1}_\mathbf{n}' = (1,1,\ldots,1) \in \Re^n$.