Econ 5233 – Cary Deck Name _____________

Exam 1 - 2008 Score _____________

Q1. A= $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, B= $\begin{bmatrix} -3 & -2 \\ 6 & 4 \end{bmatrix}$, C= $\begin{bmatrix} 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$, D= $\begin{bmatrix} -1 & 1 \\ 0 & 2 \\ -2 & 0 \end{bmatrix}$, E= $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

Find the following values if possible. If it is not possible explain why.

a. A^TC
b. $|CD|$
c. DC
d. $2B+ E^TAE$
e. BD
f. E^TCE
g. A^{-1}
h. B^{-1}

Q2. A= $\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$ and B= $\begin{bmatrix} 1 & 1 \\ 1 & 4 \end{bmatrix}$

a. Show that the trace of A is the sum of its eigenvalues.
b. Show that the determinant of B is the product of its eigenvalues.
c. Find a matrix P such that AP=PD where D is a diagonal matrix.
d. What are the eigenvalues of B^{-1}?

Q3. Consider the following system of equations

$$3x+2y=6$$
$$x+y+z=10$$
$$2y-z=1$$

a. Write out this system of equations in A**x**=**b** form.
b. Use Cramer's rule to determine the values of x, y, and z.
c. Create an augmented matrix A|**b** and use elementary row operations to find the solution for **x**.
d. Find A-1 and use it to determine the solution **x**.

Q4. Determine the rank of A= $\begin{bmatrix} 1 & 4 & 2 \\ 4 & 7 & 3 \\ 0 & 1 & 1 \end{bmatrix}$.

Q5. For each of the following matrices determine if the matrix is positive definite, positive semidefinite, negative definite, negative semidefinite, or indeterminate using principal minors.

a. A= $\begin{bmatrix} 8 & 4 & 0 \\ 4 & 2 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ b. B = $\begin{bmatrix} -2 & 2 & 1 \\ 2 & -5 & 0 \\ 1 & 0 & -1 \end{bmatrix}$

Q6. In a competitive market the demand for a good is given by P=A-BQ and the supply curve is given by P=Q+T where T is a per unit tax.

a. Using matrix algebra, determine the reduced form equations for P and Q.
b. Find the comparative static effect for an increase in T.
c. Find the comparative static effect due to a decrease in B.

Q7. B is a 2x2 matrix. Show that B^TB is positive definite if B is invertible.