MAS 3105 Feb 3, 2011
Quiz II and Key Prof. S. Hudson

1) [15pt] Use an inverse matrix to find the 2×2 matrix X such that $BX = C$, given that

$$B = \begin{pmatrix} 0 & 1 \\ 1 & 3 \end{pmatrix} \quad C = \begin{pmatrix} 0 & 2 \\ 0 & 1 \end{pmatrix}$$

2) [10pt] What is the MATLAB notation for A^T ? [if you are using other software, explain, and answer for your software (at your own risk)].

3) [20pt] True-False. You can assume all the matrices are square here, and in problem 4 below.

There is an elementary matrix E such that det $E = 0$.

If $\mathbf{x} = (1, 2, 3)^T$ is a solution of the square system $A\mathbf{x} = \mathbf{0}$, then det $A = 0$.

For every square matrix, $\det(A^k) = (\det A)^k$

If A and B are row equivalent, then they have the same determinant.

If A is singular, then A adj $(A) = O$ (the zero matrix).

4) [15pt] Prove ONE: You can answer on the back.

a) If A is a symmetric nonsingular matrix, then A^{-1} is also symmetric [if you know a formula for the transpose of A^{-1}, you can use it without proving it].

b) Prove this part of the TFAE theorem: If A is row equivalent to I, then A is nonsingular.

c) If A is nonsingular, prove that $\det(A) \neq 0$ [part of a Ch 2.2 theorem].

Remarks and Answers: I gave people a small break on the MATLAB problem, since the lab access has been difficult; if you missed that one, I reduced the problem to 5 points and raised the TF problem to 25. The overall average was 45/60. The unofficial scale is:

A's: 51 to 60
B's: 45 to 50
C's: 39 to 44
D's: 33 to 38
F's: 0 to 32

1) $X = B^{-1}C =$

$$\begin{pmatrix} 0 & -5 \\ 0 & 2 \end{pmatrix}$$

2) A'

3) FTTFT

4) See text, or me.