MAS 3105 May 19, 2005
Quiz 2 Prof. S. Hudson

Name

Show all your work and reasoning for maximum credit. If you continue your work on another page, be sure to leave a note. Do not use a calculator, book, or any personal paper. You may ask about any ambiguous questions or for extra paper. If you use extra paper, hand it in with your exam.

1) If possible, find nonzero matrices A, B and C such that $CA = CB$ but $A \neq B$. If it is not possible, explain why not.

Answer: There are lots of possible answers. I chose matrices so that $CA = 0$ and then I set $B = 2A$. For example,

$$C = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix} \quad A = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$$

2) Find the inverse of the matrix A by using Gaussian elimination on an augmented matrix. Check your answer by multiplying.

$$A = \begin{pmatrix} 1 & 2 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix}$$

Answer:

$$A^{-1} = \begin{pmatrix} 1 & -2 & 4 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{pmatrix}$$

3) Choose ONE of these to prove. 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) If A, B and C are 3x3 matrices such that $AB = C$ and B is singular, then C is also singular.

c) If A is 3x3 and the system $Ax = b$ has a unique solution, then A is nonsingular. (Do not assume that $b = 0$).

Answer to a): $[A^{-1}]^T = [A^T]^{-1} = A^{-1}$ (explain each step), so A^{-1} is symmetric. Parts b) and c) were HW and I think you can find the answers on previous keys.