

**MATH 205A,B - LINEAR ALGEBRA
FALL 2015**

QUIZ 5

NAME:

Section:(Circle one) A(8 : 00) B(9 : 30)

Show ALL your work CAREFULLY.

(a) Use row operations to find $\det A$ where

$$A = \begin{bmatrix} a & b & c \\ a+x & b+x & c+x \\ a+y & b+y & c+y \end{bmatrix}.$$

Note that

$$\det A = \det \begin{bmatrix} a & b & c \\ a+x & b+x & c+x \\ a+y & b+y & c+y \end{bmatrix} = \det \begin{bmatrix} a & b & c \\ x & x & x \\ y & y & y \end{bmatrix} = \det \begin{bmatrix} a & b & c \\ x & x & x \\ 0 & 0 & 0 \end{bmatrix} = 0.$$

(b) Use row operations to find $\det B$ where

$$B = \begin{bmatrix} 8 & 8 & 8 & 7 \\ 8 & 2 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 8 & 8 & 3 & 0 \end{bmatrix}.$$

Is B invertible?

Note that

$$\det B = \det \begin{bmatrix} 8 & 8 & 8 & 7 \\ 8 & 2 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 8 & 8 & 3 & 0 \end{bmatrix} = (-1) \det \begin{bmatrix} 1 & 0 & 0 & 0 \\ 8 & 2 & 0 & 0 \\ 8 & 8 & 8 & 7 \\ 8 & 8 & 3 & 0 \end{bmatrix} = \det \begin{bmatrix} 1 & 0 & 0 & 0 \\ 8 & 2 & 0 & 0 \\ 8 & 8 & 3 & 0 \\ 8 & 8 & 8 & 7 \end{bmatrix} = (1)(2)(3)(7) = 42.$$

It follows that B is invertible since $\det B = 42 \neq 0$.