

Name: \_\_\_\_\_  
Student ID #: \_\_\_\_\_

**Mini-Quiz # 3**  
MAT-022A-Summer Session II (8/7/09)

You have 10 minutes. You may only use a pencil (or pen) and scrap paper. No calculators, notes or books.

1. For the following matrices state whether they are in (i) reduced row echelon form (RREF), (ii) row echelon form but not RREF, or (iii) neither. (2 points each).

(a)  $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$ . **Answer:**(ii)

(b)  $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix}$ . **Answer:**(iii)

(c)  $\begin{bmatrix} 0 & 1 & 2 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  **Answer:**(i)

For definitions, please check Link1

2. Use elementary row operations to reduce the following matrix into reduced row echelon form. You must clearly indicate which elementary row operation you are using and show the resulting transformation at each step. (4 points. Use reverse side if necessary.)

$$\begin{bmatrix} 3 & 0 & 3 & -1 & 1 \\ 1 & 0 & 1 & 1 & 0 \end{bmatrix}$$

**Solution:**

Row Operation1:  $\begin{bmatrix} 3 & 0 & 3 & -1 & 1 \\ 1 & 0 & 1 & 1 & 0 \end{bmatrix}$  multiply the 1st row by  $1/3 \Rightarrow \begin{bmatrix} 1 & 0 & 1 & -1/3 & 1/3 \\ 1 & 0 & 1 & 1 & 0 \end{bmatrix}$

Row Operation2: add -1 times the 1st row to the 2nd row  $\Rightarrow \begin{bmatrix} 1 & 0 & 1 & -1/3 & 1/3 \\ 0 & 0 & 0 & 4/3 & -1/3 \end{bmatrix}$

Row Operation3: multiply the 2nd row by  $3/4 \Rightarrow \begin{bmatrix} 1 & 0 & 1 & -1/3 & 1/3 \\ 0 & 0 & 0 & 1 & -1/4 \end{bmatrix}$

Row Operation4: add  $1/3$  times the 2nd row to the 1st row  $\Rightarrow \begin{bmatrix} 1 & 0 & 1 & 0 & 1/4 \\ 0 & 0 & 0 & 1 & -1/4 \end{bmatrix}$