

MAC1140 SEC29 Quiz 11-02-2007 10.3

Mr. Fei Hua (fhua@math.fsu.edu)

Full Name: Fei Hua

Sec#:

Date:

1.

[10.3.1aPT] Choose the echelon form of the following matrix

$$\begin{bmatrix} -4 & 1 & -2 \\ 2 & -4 & -4 \end{bmatrix}$$

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

$\begin{bmatrix} 1 & 0 & \frac{6}{7} \\ 0 & 1 & \frac{10}{7} \end{bmatrix}$

$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & \frac{10}{7} \end{bmatrix}$

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

$\begin{bmatrix} 1 & 0 & \frac{6}{7} \\ 0 & 1 & 1 \end{bmatrix}$

$$\begin{bmatrix} 2 & -4 & -4 \\ -4 & 1 & -2 \end{bmatrix} \begin{matrix} R_2 \\ R_1 \end{matrix}$$

$$\begin{bmatrix} 1 & -2 & -2 \\ -4 & 1 & -2 \end{bmatrix} R_1 \cdot \frac{1}{2}$$

$$\begin{bmatrix} 1 & -2 & -2 \\ 0 & -7 & -10 \end{bmatrix} R_2 + R_1 \cdot 4$$

$$\begin{bmatrix} 1 & -2 & -2 \\ 0 & 1 & \frac{10}{7} \end{bmatrix} R_2 \cdot (-\frac{1}{7})$$

$$\begin{bmatrix} 1 & 0 & \frac{6}{7} \\ 0 & 1 & \frac{10}{7} \end{bmatrix} R_1 + 2R_2$$

$$\begin{array}{r} R_2 \quad -4 \quad 1 \quad -2 \\ \hline 4R_1 \quad 4 \quad -8 \quad -8 \\ \hline 0 \quad -7 \quad -10 \end{array}$$

Already in echelon form, but not among choices, because ER is not unique. Let's do more ERO while retaining the EF structure to see what we can get.

$$\begin{array}{r} R_1 \quad 1 \quad -2 \quad -2 \\ \rightarrow R_3 \quad 0 \quad 2 \quad \frac{20}{7} \\ \hline 1 \quad 0 \quad \frac{6}{7} \end{array}$$

2.

[10.3.1bPT] Choose the reduced row echelon form of the following matrix

$$\begin{bmatrix} 2 & -3 & -1 & -4 \\ -1 & 2 & 1 & 5 \\ 3 & -4 & -1 & 1 \end{bmatrix}$$

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

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

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

$$\begin{bmatrix} -1 & 2 & 1 & 5 \\ 2 & -3 & -1 & -4 \\ 3 & -4 & -1 & 1 \end{bmatrix} \begin{matrix} R_2 \\ R_1 \\ R_3 \end{matrix}$$

$$\begin{bmatrix} -1 & 2 & 1 & 5 \\ 2 & -3 & -1 & -4 \\ 3 & -4 & -1 & 1 \end{bmatrix} R_1 \cdot (-1)$$

$$\begin{bmatrix} 1 & -2 & -1 & -5 \\ 2 & -3 & -1 & -4 \\ 3 & -4 & -1 & 1 \end{bmatrix} R_2 - 2R_1, R_3 - 3R_1$$

$$\begin{bmatrix} 1 & -2 & -1 & -5 \\ 0 & 1 & 1 & 6 \\ 0 & 2 & 2 & 16 \end{bmatrix} R_3 - 2R_2$$

$$\begin{bmatrix} 1 & 0 & -3 & -16 \\ 0 & 1 & 1 & 6 \\ 0 & 0 & 0 & 4 \end{bmatrix} R_3 \cdot \frac{1}{4}$$

$$\begin{array}{r} R_2 \quad 2 \quad -3 \quad -1 \quad -4 \\ \hline -2R_1 \quad -2 \quad 4 \quad 2 \quad 10 \\ \hline 1 \quad 1 \quad 6 \end{array}$$

$$\begin{array}{r} R_3 \quad 3 \quad -4 \quad -1 \quad 1 \\ \hline -3R_1 \quad -3 \quad 6 \quad 3 \quad 15 \\ \hline 2 \quad 2 \quad 16 \end{array}$$

$$\begin{array}{r} R_3 \quad 0 \quad 2 \quad 2 \quad 16 \\ \hline -2R_2 \quad 0 \quad -2 \quad -2 \quad -12 \\ \hline 0 \quad 0 \quad 0 \quad 4 \end{array}$$

EF \rightarrow

○ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

○ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$

REF $\rightarrow \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{matrix} R_1 + 5R_3 \\ R_2 - 6R_3 \end{matrix}$

$\begin{matrix} R_1 & 1 & -2 & -1 & 0 \\ 2R_2 & 0 & 2 & 2 & 0 \\ \hline & 1 & 0 & 1 & 0 \end{matrix}$

3.

[10.3.3aPT] Select the matrix which is in reduced row echelon form

○ $\begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & 1 & 0 & -4 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad 1 \ 2 \ 3$

○ $\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad 1 \ 2 \ 4$

○ $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix} \quad 3 \ 2 \ 1$

• None of these

○ $\begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

4.

[10.3.1bPT] Choose the reduced row echelon form of the following matrix

$\begin{bmatrix} 2 & -3 & -1 & 0 \\ 3 & 2 & 2 & 2 \\ 1 & 5 & 3 & 2 \end{bmatrix}$

• $\begin{bmatrix} 1 & 0 & \frac{4}{13} & \frac{6}{13} \\ 0 & 1 & \frac{7}{13} & \frac{4}{13} \\ 0 & 0 & 0 & 0 \end{bmatrix}$

○ $\begin{bmatrix} 1 & 0 & 4 & 6 \\ 0 & 1 & 7 & 4 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

$\begin{bmatrix} 1 & 5 & 3 & 2 \\ 3 & 2 & 2 & 2 \\ 2 & -3 & -1 & 0 \end{bmatrix} \begin{matrix} R_3 \\ R_1 \end{matrix}$

$\begin{matrix} R_2 & 3 & 2 & 2 \\ -3R_1 & -3 & -15 & -6 \\ \hline & -13 & -7 & -4 \end{matrix}$

$\begin{bmatrix} 1 & 5 & 3 & 2 \\ 0 & -13 & -7 & -4 \\ 0 & -13 & -7 & -4 \end{bmatrix} \begin{matrix} R_2 - 3R_1 \\ R_3 - 2R_1 \end{matrix}$

$\begin{matrix} R_3 & 2 & -3 & -1 & 0 \\ -2R_1 & -2 & -10 & -6 & -4 \\ \hline & 0 & -13 & -7 & -4 \end{matrix}$

$\begin{bmatrix} 1 & 5 & 3 & 2 \\ 0 & -13 & -7 & -4 \\ 0 & 0 & 0 & 0 \end{bmatrix} R_3 - R_2$

EF $\rightarrow \begin{bmatrix} 1 & 0 & \frac{3}{13} & \frac{2}{13} \\ 0 & 1 & \frac{7}{13} & \frac{4}{13} \\ 0 & 0 & 0 & 0 \end{bmatrix} R_2 \cdot (-\frac{1}{13})$

$$\circ \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

$$\circ \begin{bmatrix} 1 & 0 & -\frac{4}{13} & \frac{6}{13} \\ 0 & 1 & \frac{7}{13} & \frac{4}{13} \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\circ \begin{bmatrix} 1 & 0 & 0 & \frac{26}{7} \\ 0 & 1 & 1 & \frac{4}{7} \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & \frac{4}{13} & \frac{6}{13} \\ 0 & 1 & \frac{7}{13} & \frac{4}{13} \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$R_1 - 5R_2 \leftarrow \begin{array}{cccc} R_1 & 1 & 5 & 3 & 2 \\ -5R_2 & 0 & -5 & -\frac{35}{13} & -\frac{20}{13} \\ \hline & 1 & 0 & \frac{4}{13} & \frac{6}{13} \end{array}$$

5.

[10.3.2PT] Choose the type of solution for the linear system having the following augmented matrix

$$\left[\begin{array}{ccc|c} 1 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & \frac{2}{3} \end{array} \right]$$

$$\begin{cases} x - y = \frac{1}{2} \\ z = 0 \\ 0 = \frac{2}{3} \end{cases}$$

never true.

- Infinitely many solutions
- Exactly three solutions
- No solution
- Unique solution
- None of these