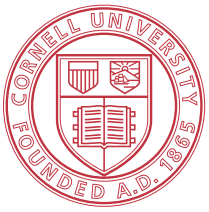

Math 2940 Quiz 1 Solutions

September 12th, 2019
Section 205

Name:

NetID:

Row reduce the following matrix to *reduced* echelon form. Circle the pivot positions in the final matrix, and list the pivot columns.

$$\begin{bmatrix} 1 & 3 & 5 & 2 \\ 3 & 5 & 7 & 9 \\ 5 & 7 & 9 & 6 \end{bmatrix}$$

Solution: We can row reduce the matrix as follows:

$$\begin{bmatrix} 1 & 3 & 5 & 2 \\ 0 & -4 & -8 & 3 \\ 0 & -8 & -16 & -4 \end{bmatrix} \begin{matrix} \\ \leftarrow \text{ Row } 2 + (-3) \cdot \text{ Row } 1 \\ \leftarrow \text{ Row } 3 + (-5) \cdot \text{ Row } 1 \end{matrix}$$

$$\begin{bmatrix} 1 & 3 & 5 & 2 \\ 0 & -4 & -8 & 3 \\ 0 & 0 & 0 & -10 \end{bmatrix} \leftarrow \text{ Row } 3 + (-2) \cdot \text{ Row } 2$$

$$\begin{bmatrix} 1 & 3 & 5 & 2 \\ 0 & 1 & 2 & -3/4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{matrix} \\ \leftarrow \left(\frac{-1}{4}\right) \cdot \text{ Row } 2 \\ \leftarrow \left(\frac{-1}{10}\right) \cdot \text{ Row } 3 \end{matrix}$$

$$\begin{bmatrix} 1 & 3 & 5 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{matrix} \leftarrow \text{ Row } 1 + (-2) \cdot \text{ Row } 3 \\ \leftarrow \text{ Row } 2 + \left(\frac{3}{4}\right) \cdot \text{ Row } 3 \\ \\ \end{matrix}$$

$$\begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \leftarrow \text{ Row } 1 + (-3) \cdot \text{ Row } 2$$

Now the matrix is in reduced echelon form. With the pivot positions circled:

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

Pivot columns are 1, 2, and 4