

Determine whether the following matrices are in row echelon form. Circle the pivot entries.

1.

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

2.

$$\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 2 \\ 0 & 2 & 3 \end{bmatrix} \quad \text{No}$$

3.

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 \\ 0 & 2 & 0 & 1 \end{bmatrix} \quad \text{No}$$

4.

$$\begin{bmatrix} 1 & 2 & 4 \\ 0 & 0 & 0 \\ 0 & 0 & 2 \end{bmatrix} \quad \text{No (the zero row is not at the bottom)}$$

5.

$$\begin{bmatrix} 0 & 1 & 3 & 0 \\ 0 & 0 & 9 & 2 \\ 0 & 0 & 0 & 7 \end{bmatrix} \quad \text{Yes}$$

6.

$$\begin{bmatrix} 2 & 1 & 3 & 0 \\ 0 & 3 & 9 & 2 \\ 0 & 0 & 2 & -1 \end{bmatrix} \quad \text{Yes}$$