Name: _____

206 Quiz 4

1. Let

$$A = \begin{bmatrix} 1 & 0 & -3 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 1 & 2 & -1 & 1 & 6 \\ 1 & -1 & -4 & 0 & 0 \end{bmatrix}.$$

Find a basis for $\ker A$ and a basis for $\operatorname{im} A$.

2. Suppose that

$$A = \begin{bmatrix} \mathbf{v}_1 & \mathbf{v}_2 & \mathbf{v}_3 & \mathbf{v}_4 & \mathbf{v}_5 \end{bmatrix}$$

and

$$B = \operatorname{rref} A = \begin{bmatrix} 1 & -2 & 0 & 2 & 0 \\ 0 & 0 & 1 & 3 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}.$$

Find a basis for $\ker A$ and a basis for $\operatorname{im} A$.

3. Suppose that $\mathbf{v}_1, \ldots, \mathbf{v}_k$ are linearly dependent vectors in $\mathbb{R}^m$. Let T be a linear transformation $T : \mathbb{R}^m \to \mathbb{R}^n$. Show that the vectors $T(\mathbf{v}_1), \ldots, T(\mathbf{v}_k)$ are linearly dependent vectors.