Similarity Transformations

In class, we showed that for the matrix

$$A = \begin{pmatrix} 5 & 2 \\ 4 & 3 \end{pmatrix},$$

the diagonalization was given by

$$S = \begin{pmatrix} 1 & 1 \\ 1 & -2 \end{pmatrix}, \qquad \Lambda = \begin{pmatrix} 7 & 0 \\ 0 & 1 \end{pmatrix}.$$

For the point $\mathbf{x} = (3, -3)^T$, we showed that

$$[\mathbf{x}]_Z = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, \qquad [A\mathbf{x}]_Z = \begin{pmatrix} 7 \\ 2 \end{pmatrix},$$

as shown in the figure below.