

Question 3

Sunday, October 22, 2023

10:27 PM

3. Consider the transformations S and T and the bases B and E from Q1. Find the following matrices of transition from basis to basis:

$$[id]_{B \rightarrow E}, [id]_{E \rightarrow B}$$

Check that the formula of transition from basis to basis holds in the following cases:

$$[T]_B = [id]_{E \rightarrow B} [T]_E [id]_{B \rightarrow E}$$

$$[S]_E = [id]_{B \rightarrow E} [S]_B [id]_{E \rightarrow B}$$

$$[id]_{B \rightarrow E} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{array}{r} x^3 + 3x^2 + 3x + 1 \\ -3x^2 - 6x - 3 \\ + 3x + 3 \\ \hline -1 \end{array}$$

$$[id]_{E \rightarrow B} = \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 1 & -2 & 3 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$[T]_B = \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 1 & -2 & 3 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 1 \end{bmatrix} [T]_E \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$[S]_E = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix} [S]_B \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 1 & -2 & 3 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$