Quiz 5 solution

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1

Easy to check that

$$Ax = T(x) = \begin{bmatrix} -3 \\ 1 \\ 0 \\ 0 \end{bmatrix} x_1 + \begin{bmatrix} 2 \\ -4 \\ 0 \\ 1 \end{bmatrix} x_2 = \begin{bmatrix} -3 & 2 \\ 1 & -4 \\ 0 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

So

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

2 e

By using the algorighm of inverting the matrix we could find

$$A^{-1} = \begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix}$$

So

$$A^{-1}B = \begin{pmatrix} A^{-1} \begin{bmatrix} 3 \\ 1 \end{bmatrix} & A^{-1} \begin{bmatrix} 0 \\ 2 \end{bmatrix} & A^{-1} \begin{bmatrix} 1 \\ 0 \end{bmatrix} \end{pmatrix}$$

So the second column of $A^{-1}B$ should be

$$A^{-1} \begin{bmatrix} 0 \\ 2 \end{bmatrix} = \begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \end{bmatrix}$$

And we can compute this by simple matrix multiplication and we got

$$\begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \end{bmatrix} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$$