

Q 4

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1. (easy)

We have the $n \times n$ matrices A and B , what demands must we have on A and B to solve the equation $AX = B$ for X ?

2. (hard)

We have the real-valued matrix

$$B = \begin{pmatrix} 0 & 4 & -2 \\ 4 & 6 & 4 \\ -2 & -5 & -1 \end{pmatrix}$$

Let E be such that $E = EE^t = EE$.

Then let G be a set of 3×3 matrices A satisfying $AA^t = AEA^t = E$,

$$G = \{A : AA^t = AEA^t = E\}$$

1. Find a matrix C so that $BC \in G$ and then find all other elements in G .
2. Find all E such that G is a group. What is the identity element?