

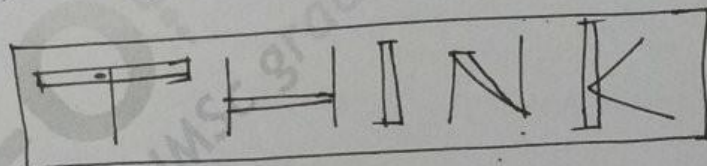
Today's IIScian Approach

Q If P and Q are invertible matrices such that $PQ = -QP$, then we can conclude that

- (1) $\text{Tr}(P) = \text{Tr}(Q) = 0$ (2) $\text{Tr}(P) = \text{Tr}(Q) = 1$
 (3) $\text{Tr}(P) = -\text{Tr}(Q)$ (4) $\text{Tr}(P) \neq \text{Tr}(Q)$

Sol:-

How to



Recall some basic Facts:-

• matrices $A_{n \times n}$ and $B_{n \times n}$ are said to be similar if $\exists P$ s.t. $P^{-1}AP = B$.

• If A and B are similar then $\text{Tr}(A) = \text{Tr}(B)$ (Just by)

• Here $PQ = -QP \Rightarrow P^{-1}QP = (-Q)$

$\Rightarrow Q$ is similar to $-Q$

$\Rightarrow \text{Tr}(Q) = \text{Tr}(-Q) \Rightarrow \text{Tr}(Q) = -\text{Tr}(Q)$

$\Rightarrow 2\text{Tr}(Q) = 0 \Rightarrow \text{Tr}(Q) = 0$

• Similarly $\text{Tr}(P) = 0 \Rightarrow \text{Tr}(P) = \text{Tr}(Q) = -\text{Tr}(Q) = 0$