PROBLEM OF THE DAY 9/29

LET \( G = GL(m, \mathbb{R}) = \{ m \times m \text{ invertible real matrices} \} \), \( m \geq 2 \)

CONSIDER \( G \xrightarrow{\phi} G \) DEFINED BY \( \phi(A) = (A^T)^{-1} \), WHERE \( A^T \) IS THE TRANSPOSE OF \( A \).

(A) SHOW THAT \( \phi \) IS AN AUTOMORPHISM OF \( G \) (A GROUP AUTOMORPHISM, OF COURSE)

(B) IF \( G \xrightarrow{\gamma} Aut(G) \) IS \( x \mapsto \gamma_x \) (CONJUGATION BY \( x \), \( g \mapsto x g x^{-1} \))

SHOW THAT \( \phi \notin \text{Im}(\gamma) \). HINT: IT IS OK TO USE EIGENVALUES IN YOUR ARGUMENT.
ASSIGNMENT DUE 10/6

LANG p.76 12, 20, 22, 24, 25, 26, 33, 34