Question #65247, Math / Abstract Algebra

Q. Show that similar matrices have same eigen values.

Answer.

Let matrices A and B are similar, i.e. $B = TAT^{-1}$, where T is invertible matrix.

Thus, $B - \lambda I = TAT^{-1} - \lambda I = TAT^{-1} - \lambda TIT^{-1} = TAT^{-1} - T\lambda IT^{-1} =$
$= T(A - \lambda I)T^{-1}$.

So $det(B - \lambda I) = det(T(A - \lambda I)T^{-1}) = detTdet(A - \lambda I)detT^{-1} =$
$= det(A - \lambda I)$.

Since A and B have the same characteristic polynomial, they have the same eigenvalues (counting multiplicity).

References.

Section SD: Similarity and Diagonalization. (2004). Retrieved February 11, 2017, from http://aimath.org/knowlepedia/Beezer/

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