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Different Matrices with the Same Eigenvalues. Preliminary report.

We consider real square matrices of some fixed order n . Let us take any matrix X and also a matrix W which has an inverse. If we define $Y = WXW^{-1}$, then in general X and Y are different matrices but they have the same eigenvalues. This is a well-known fact: similar matrices have the same eigenvalues.

Recently Beken discovered a very interesting result: if J and K are imaginaries ($J^2 = K^2 = -I$), then $J + JK$ and $K + JK$ have the same eigenvalues. In proving this, the concept of similarity is *not* used. Other results can be obtained for nilpotents, idempotents and involutions.

Experiments with MATLAB (I'm lovin' it!) suggest other interesting results for more general matrices, but these results have not yet been proved. We will discuss these experiments. (Received July 25, 2005)