How do we really find eigenvalues?

by

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Abstract: In this talk we will discuss the equivalence of the problems for finding the eigenvalues of a matrix and the roots of a polynomial. We will see that there are some serious drawbacks to approaching the eigenvalue problem as a root finding problem. Moreover, we can approach the eigenvalue problem as an invariant subspace problem. In doing so, we will explain the main driving force behind some of the most successful algorithms for finding eigenvalues, such as the QR algorithm and Francis’s algorithm. Lastly, we will come across some natural extensions of the eigenvalue problem to other areas of mathematics, such as orthogonal polynomials and numerical integration.

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