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INVERSE, SHIFTED INVERSE, AND RAYLEIGH QUOTIENT ITERATION AS NEWTON'S METHOD

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The inverse, shifted inverse, and Rayleigh quotient iterations are well-known algorithms for computing an eigenvector of a symmetric matrix. In this talk we demonstrate that each one of these three algorithms can be viewed as a standard form of Newton's method from the nonlinear programming literature, involving an ℓ_2 -norm projection. This provides an explanation for their good behavior despite the need to solve systems with nearly singular coefficient matrices. Our equivalence result also leads us naturally to a new proof that the convergence of the Rayleigh quotient iteration is q -cubic with rate constant at worst 1.