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The basis pursuit problem seeks a minimum one-norm solution of an underdetermined least-squares problem. Basis pursuit denoise fits the least-squares problem only approximately, and a single parameter determines a curve that traces the optimal trade-off between the least-squares fit and the one-norm of the solution.

We discuss the role of duality in revealing some useful properties of this curve. We exploit these properties to derive a root-finding algorithm, suitable for large-scale problems, for finding arbitrary points on the curve. Only matrix-vector operations are required. Numerical experiments on some large problems show the scalability and accuracy of the approach. (Received May 30, 2007)