# Weighted least-squares for randomised $L^2$ approximation

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We investigate the problem of approximating a function $u$ in $L^2$ with a linear space of functions of dimension $n$, using evaluations of $u$ at $m$ random points. A first approach, based on weighted least-squares at i.i.d points, provides a near-best approximation of $u$ in expected $L^2$ norm, but requires $m$ of order $n \log n$. We then reduce the sample size to $m$ of order $n$ by adapting on a result by Markus, Spielman and Srivastava, which answers the Kadison-Singer problem.