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## **Generalisation error in learning with random features and the hidden manifold model**

We study generalised linear regression and classification for a synthetically generated dataset encompassing different problems of interest, such as learning with random features, neural networks in the lazy training regime, and the hidden manifold model. We consider the high-dimensional regime and using the replica method from statistical physics, we provide a closed-form expression for the asymptotic generalisation performance in these problems, valid in both the under- and over-parametrised regimes and for a broad choice of generalised linear model loss functions. In particular, we show how to obtain analytically the so-called double descent behaviour for logistic regression with a peak at the interpolation threshold, we illustrate the superiority of orthogonal against random Gaussian projections in learning with random features, and discuss the role played by correlations in the data generated by the hidden manifold model. Beyond the interest in these particular problems, the theoretical formalism introduced in this manuscript provides a path to further extensions to more complex tasks.