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Homework #3

1. True, to see if a system is linearly independent we can put the columns in a matrix and take the determinant, but if one of the columns is all 0s the determinant always goes to 0. (This is particularly easy to see in 2x2 and 3x3 cases)
2. True, if 2 vectors are linearly dependent in a set of N vectors, then the entire set is linear dependent since the determinant again will always go to 0 of this system.
3. Separability is a quality of filters that can be decomposed into component parts, which can lead to an overall decrease in the required computational complexity

A separable filter W is the product of 2 or more separable filters, we could perform a convolution in where *k*  is the height of kernel. However if we could pull the filter into its verticle and horizontal parts we could perform the operation in . Therefore if we let then we have a reduction from (

1. When we take the gaussian of a gaussian we get a gaussian.
2. Dimensionality reductions allow us to reduce our space to just a set of principle components. Dim reduction may improve accuracy in some instances as well as reduce runtime, Dim reduction may cause worse accuracy in other situations.
3. A = [a11, a12; a21, a22]. We know that det(A) = a11a22 - a21a12. We also know that to solve for the eigenvalues of A we would take, and solve for So we would get . Now let and let then we have that . Now let where . Therefore so therefore D = Det(A) =