Homework 5

Due date: Friday, December 1

Software engineering. This homework is a bit different than the others. Here, you are asked to develop a piece of matlab code which computes all the eigenvalues and eigenvectors of a matrix. It should produce something analog to the matlab function `eig` which is typically invoked as follows: `[V,D] = eig(X)` where the columns of the matrix `V`, are the eigenvectors and the diagonal elements of `D` the eigenvalues.

You can use all the things we have seen in class but you can not use built-in matlab numerical algebra routines. For instance, if you want to use a QR decomposition, you will have to develop your own. You need to make sure that your eigenvalue solver is accurate and efficient, meaning that it should run in about $O(n^3)$ flops for an n by n matrix. You will also need to report some tests comparing your solver with matlab's solver in terms of speed and accuracy. (*Hint*: you are allowed to use matlab functions such as `hess, shur, qr` and so on to debug your code if needed.)

Good luck! This should be fun.