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: \([V,D] = \text{eig}(X)\) 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.