

## 18.085 Homework 3 MATLAB problem

For the matrices of MATLAB 1, using 3 first differences for  $-du'' + u'$ , find the eigenvalues of all three for  $h = 1/11$ . Then do the same with  $d = 1/25$  reduced to  $d = .01$ . You can reduce  $d$  more if you want. I am expecting bad/good to be somehow identified by the eigenvalues—and maybe by the eigenvectors too! You could use `[V,E]=eig( )` and find the the singular values of  $V$  to see how far the eigenvectors are from orthogonal. The singular values are `sqrt(eig(V'*V))` and the ratio of largest to smallest is the *condition number* of  $V$ .