Challenge problem for WED April 21

Phil Anderson won the Nobel Prize in Physics for a very successful study of eigenvectors of matrices that have ***random main diagonal*** and -1 on the first subdiagonal and superdiagonal (thus symmetric). You can use MATLAB's `randn` (normal distribution) and plot the eigenvalues and eigenvectors for an 8 by 8 matrix. Experiment to get a typical case.

You must compare those eigenvectors with the other extreme when all diagonal entries are 2. See Worked Example 6.4A for the extreme importance of that $-1, 2, -1$ matrix and its eigenvectors. Plot its eigenvalues against the eigenvalues for the random diagonal case. Plot the eigenvectors for the lowest and the highest eigenvalues in both cases. In 2 or 3 sentences say what you observe.

If you see any interesting extension to other related matrices, include that too (not required).