Math 22 Lin Alg: Homework 9

due Wed Aug 23   . . . but best if do relevant questions after each lecture

Last one!

6.1: (goals see HW8)

19, 24 (why is it called the parallelogram law?)

6.2: Goals: Know properties of orthogonal sets, how to compute orthogonal projections, how to change into a coordinate system with an orthogonal basis via projections, and know properties of orthonormal matrices .

2, 10, 14, 16, 20 (carful: don't get confused with how probability vectors were 'normalized'), 28 (the fact that a square matrix with orthonormal columns also has orthonormal *rows* is beautiful and not obvious!).

6.3: Goals: Know the orthogonal projection theorem, the best approximation theorem, and how to compute projections using orthogonal matrices.

2, 8, 15, 22, 24 (try to make each explanation use watertight logic, rather than intuitive. c is a beautiful result analogous to the rank theorem).

6.5: Goals: Be able to solve least-squares problems using the normal equations, understand that a least-squares problem is an orthogonal projection.

2, 9, 20 (hint: what does L.I. columns mean for the solution set of the homogeneous equation?)

7.1: Goals: Know that symmetric matrices are orthogonally diagonalizable, understand the spectral theorem and the spectral decomposition of a symmetric matrix.

8 (Bonus: what transformation does this matrix do?),

20 (good review for final, note eigenvalues are given for you)

35 (here you explore the properties of a *rank-1 projection matrix B*. Property b is called *idempotent*, and is a beautiful property of all projections).