Exam 3 Review

- 6.1 Inner Products
  - definition of norm and distance
  - computing the inner product of vectors in $\mathbb{R}^n$ and inner product of functions in $C[a, b]$
- 6.2 Angle and Orthogonality
  - Orthogonal subspaces
  - Orthogonal complement
  - 4 fundamental subspaces and their relationships
  - projection onto a subspace (build an orthogonal basis)
  - writing a vector as a linear combination of vectors in an orthogonal basis
  - new parts of snowball theorem (page 314)
- 6.3 Orthonormal basis
  - orthonormal vs. orthogonal
  - orthogonal set implies linearly indep. set
  - projection theorem (see page 322)
  - Gram-Schmidt process for making orthogonal set
- 7.1 Eigenproblem
  - finding eigenpairs (equivalent conditions)
  - verifying eigenvectors
  - triangular and diagonal matrices
  - characteristic equation
- 7.2 Diagonalization
  - what does diagonalizable mean?
  - when is a matrix diagonalizable? (lin. ind. eignvectors)
  - what does nullity have to with diagonalibility?
  - using diagonalization for matrix powers
  - distinct eigenvalues mean linearly indep. eigenvectors
  - defective matrix

Switch to Diff Eq Book

- 1.2Separable DE's
  - basic idea of DE
  - solution of separable - general solution
  - initial value problem
- 2.1 Modeling with systems of DE's
  - predator prey
  - harmonic oscillator

- 2.2 Geometry (phase planes)
  - finding equilibrium
  - intro to phase plane
  - direction field/vector field
- 3.1 Linear systems and linearity
  - general solution
  - initial value problem
  - how do we verify a vector function is a solution?
- 3.2 Straight line solutions (real eigenvalues)
  - using eigenpairs to contruct straight line solutions
  - building general solutions
  - geometric interpretation of straigt line solutions
- 3.3 Phase planes for systems with real distinct eigenvalues
  - sink, source, saddle (when?)
  - be able to draw each case and typical solutions in 4 "quadrants"
- 3.4 Phase planes for systems with complex eigenvalues
  - general solution
  - phase portrait: center vs. spiral
  - determining rotation direction by using a few points.