5.1 - Eigenvalues and Eigenvectors

- Use this to instantly get the characteristic polynomial of a 2x2 matrix A:

$$O = \lambda^2 - trace(A) + det(A)$$

$$A = \begin{bmatrix} 4 & -3 \\ 7 & 2 \end{bmatrix}$$

$$Char. pol.$$

- To check your eigenvalues using a calculator, set up this equation:

$$Y = det(X*identity(n) - [A])$$

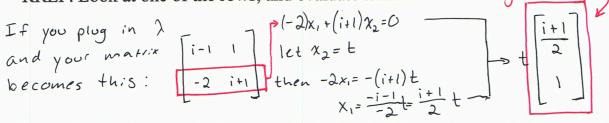
where n is the matrix size and [A] is the matrix for which you seek eigenvalues. The eigenvalues will be the zeroes of the graph. You will also be able to visually identify multiplicity.

5.2 – Diagonalization

- It's easy to make mistakes along the way to calculating P. Once you've found it, check it immediately by verifying that P⁻¹AP = D, and that the positions of the eigenvalues in D correspond to the order of the eigenvectors in P. If they do not, go back and correct your error before moving on.
- $-A^k = PD^kP^{-1}$

5.3 - Complex Vector Spaces

- Once you substitute one of your eigenvalues into $\lambda I - A$, don't try and RREF. Look at one of the rows, and evaluate it like so:



- For 2x2s: Once you calculate one of your eigenvectors, the second eigenvector is the conjugate of the first:

How to do the 5.4 problems

Use this guide alongside the posted solutions for #5 on the 2012 exam and #1 on the calculator portion of the 2013 exam. They are good examples, and follow the same processes outlined below.

- 1) Represent the system as a linear combination of matrices. Name those matrices y', A, and y.
- 2) Find matrices P and D, where D=P'AP and D is diagonal. Make sure that the eigenvalue in D, matches the first column of P, and so on.

Set up the following system:

Integrate both equations to form the matrix u.

u'=nu -> u=cenx

- 3) Multiply Pu to find the general sol'n for y.
- 4) Use the given initial values to find a specific solution.

 USE THE EXAMPLESII They have more info.