Math 2270-004
Homework due March 14.

Recall that problems which are not underlined are good for seeing if you can work with the underlying concepts; only the underlined problems need to be handed in. The Wednesday quiz will be drawn from all of these concepts and from these or related problems. (But we won't have a Wednesday quiz this week, since our midterm is on Friday.)

4.7 Change of basis
1, **3**, **7**, **11**, **12**, **13**.

5.1 Eigenvectors and eigenvalues
1, 3, 7, 9, 11, 13, 17, **19**, 21, **23**, **25**, **31**

5.2 The characteristic equation
1, 3, 5, **9**, **15**, **19**, **21**

5.3: 1, 3, 9, 11, 13, **21**, **23**, **25**, **29**, **31**

w9.1) Find eigenvalues and eigenvectors (or a basis for the eigenspace if the eigenspace is more than one-dimensional), for the following matrices. You can check your work with technology, but you don't have to hand in the technology check.

a) $A := \begin{bmatrix} -1 & -2 \\ 4 & 5 \end{bmatrix}$

b) $B := \begin{bmatrix} 3 & 1 \\ -1 & 1 \end{bmatrix}$

c) $C := \begin{bmatrix} 2 & 9 & 3 \\ -2 & -5 & 0 \\ 2 & 6 & 1 \end{bmatrix}$

d) $E := \begin{bmatrix} 1 & 6 & 6 \\ 0 & -1 & -2 \\ 0 & 4 & 5 \end{bmatrix}$

e) $F := \begin{bmatrix} 5 & 3 & -9 \\ -4 & -5 & 4 \\ 4 & 2 & -7 \end{bmatrix}$. In this problem you may use technology to compute and factor the characteristic polynomial, and to find the eigenspace bases. Be careful with what the technology is telling

you.

w9.2)

a) Which of the matrices in 9.1 are diagonalizable and which are not?

b) For the diagonalizable matrices A, C above, verify the diagonalizing identity $P^{-1}AP = \mathrm{D}$ by checking the equivalent and easier to check equation $AP = P\,\mathrm{D}$.

c) Explain what happens to the diagonal matrix D of eigenvalues for a diagonalizable matrix, if you change the order of the eigenvector columns in P, in the identity $AP = P\,\mathrm{D}$. Explain.

w9.3 Compute A^{10} for the matrix A in **w9.1a**, without technology. (Of course, you may check your answer with technology.)