Math 254 Spring 2014 Exam 11

Please read the following directions:

Please print your name in the space provided, using large letters, as "First LAST". Books, notes, calculators, and other aids are not permitted on this exam. Please write legibly, with plenty of white space. Please put your answers in the designated areas. Show all necessary work in your solutions; if you are unsure, show it. Cross out work you do not wish graded; incorrect work can lower your grade. All problems are worth 5-10 points; your total will be scaled to the standard 100 point scale. You have approximately 30 minutes.

1. Carefully state the definition of $P(t)$. Give a set of three vectors from $P(t)$.

2. You seek the Jordan Canonical Form for a 7×7 matrix. First, you find the characteristic polynomial $\Delta(t) = (t - 5)^7$. Next, you determine that the geometric multiplicity for the eigenvalue $\lambda = 5$ is 3. With this information, what are the possible minimal polynomials $m(t)$? For each possibility, determine what combinations of Jordan blocks are possible.

The remaining three problems all concern matrix $M = \begin{pmatrix} 0 & 1 & -1 \\ 2 & 0 & 2 \\ 3 & -2 & 4 \end{pmatrix}$.

3. Find the characteristic polynomial $\Delta(t)$ for M, and calculate each eigenvalue with its algebraic multiplicity. (hint: all eigenvalues are integers)

4. Find the geometric multiplicity of each eigenvalue, and a corresponding maximal independent set of eigenvectors.

5. Find the Jordan Canonical Form for M.