Name:

Math 254 Fall 2013 Exam 12

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.

Extra credit may be earned by handing in revised work to the instructor or TA before the final on Friday 12/13; for details see the syllabus. You will find this exam on the instructor's webpage later today.

1. Carefully state the definition of "matrix space" $M_{m,n}$. Give two six-dimensional examples.

2. Give a 4×4 matrix, in Jordan canonical form, whose minimal polynomial is $(t-2)^3$.

3. Give a 4×4 matrix, in Jordan canonical form, that has eigenvalues $\lambda_1 = 2$ and $\lambda_2 = 5$, such that λ_1 has both algebraic and geometric multiplicity 2, and that λ_2 has algebraic multiplicity 2 and geometric multiplicity 1.

For the last two problems, let $A = \left(\begin{smallmatrix} 1 & 1 & 1 \\ 2 & 1 & 0 \\ 0 & 1 & 2 \end{smallmatrix}\right)$.

4. Find the characteristic polynomial of A, and its eigenvalues.

5. For each eigenvalue of A, find a basis for the corresponding eigenspace.