Math 254 Fall 2014 Exam 10

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 in class on Wednesday 11/19; 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" $M_{m,n}$. Name every six-dimensional matrix space.

2. True or false: For all square matrices A, $det(A^2) \geq det(A)$. Be sure to justify your answer.

The remaining three problems concern the matrix $A = \begin{pmatrix} 1 & 2 & a \\ a & a & 1 \\ 1 & -1 & a \end{pmatrix}$, and the closely related system of linear equations $S = \{x + 2y + az = 1, ax + ay + z = 1, x - y + az = 1\}$.

3. Calculate $|A|$ using Laplace expansion on the first column. Be sure to simplify your answer.

4. Determine for which values of a (if any) the system S has a unique solution.

5. Determine which values of a (if any) will lead to the system S having a unique solution where $x = 3$.