Math 254 Fall 2012 Exam 2a

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 Friday 9/21; for details see the syllabus. You will find this exam on the instructor's webpage soon.

1. Carefully state the definition of "degenerate" in the context of linear combinations. Give two examples.

2. Solve the following system, using back-substitution. Be sure to justify your calculations.

$$
\begin{aligned}
4x_1 + 3x_2 + 2x_3 + x_4 &= 6 \\
4x_2 - 2x_3 + x_4 &= 10 \\
5x_3 + 5x_4 &= 5 \\
2x_4 &= 8
\end{aligned}
$$

3. Consider the system of equations $\{3x - 2y = 1, kx + 4y = -2\}$. For which values of k (if any) does this have exactly one solution (and what is it)? For which values of k (if any) does this have no solution? For which values of k (if any) does this have infinitely many solutions?

4. Find the line of best fit for the following set of points: $\{(2, 0), (1, -1), (0, 4)\}$.

5. Solve the following system of linear equations using Gaussian elimination and back-substitution.

$$
\begin{aligned}
2x + y + 2z &= 1 \\
-4x + 3z &= 1 \\
6x - 2y - 3z &= 4
\end{aligned}
$$