

Name:

Math 254 Fall 2013 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 9/20; for details see the syllabus. You will find this exam on the instructor’s webpage later today.

1. Carefully state the definition of “linear function space”. Give an example, in two variables, and three vectors from there.

2. Carefully state the definition of “solution to a linear system of equations”. Give an example of a linear system of equations that does *not* have a solution, and justify your answer.

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

$$\begin{aligned}6x_1 + 2x_2 - 5x_3 + x_4 &= 5 \\7x_2 + 2x_3 - 3x_4 &= 8 \\2x_3 - x_4 &= 2 \\2x_4 &= 8\end{aligned}$$

4. Find the line of best fit for the points $\{(0, -1), (-1, 0), (1, 4), (2, 5)\}$.

5. Consider the linear equation $ax + by + cz = d$. Suppose that (x_1, y_1, z_1) and (x_2, y_2, z_2) are both solutions. Prove that $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}, \frac{z_1+z_2}{2})$ is also a solution.