Math 254 Exam 2b: 9/26/6

Please read the exam instructions.

Notes, books, papers, calculators and electronic aids are all forbidden for this exam. Please write your answers on **separate paper**, indicate clearly what work goes with which problem, and put your name on every sheet. Cross out work you do not wish graded; incorrect work can lower your grade, even compared with no work at all. Keep this list of problems for your records. Show all necessary work in your solutions; if you are unsure, show it. Extra credit may be earned by handing in revised work in class on Thursday 9/28; for details see the syllabus. Each problem is worth 10 points. You have approximately 30 minutes.

1. Carefully define the term "dimension" as it applies to vector spaces. Give two examples: a three-dimensional vector space, and an infinite-dimensional vector space.

   The remaining problems all concern the following linear system:

$$\begin{aligned} x + 3y - 3z &= -4 \\ z + 3w &= -1 \\ 3x + 9y - 2z + 5w &= -3 \\ 2x + 6y + 3z - w &= 11 \\ 5x + 15y - 7w &= 17 \end{aligned}$$

2. Write the system as a matrix equation.

3. Write the system as an augmented matrix; put this matrix in echelon form. Justify each step using elementary row operations. Using the echelon form, find all solutions to the system (if any).

4. Write the system as an augmented matrix; put this matrix in row canonical form. Justify each step using elementary row operations. Using the row canonical form, find all solutions to the system (if any).

5. Write the system as an augmented matrix; put this matrix in echelon form using partial pivoting. Justify each step using elementary row operations.