

**First Exam**

*Thursday, September 8, 2016*

This exam is closed book, but you may use calculators that do not have computer algebra systems. Make sure your name is on all pages. Show all work, and show it in a logical and organized manner: You will be graded on what you show, in addition to your answer. Check your work carefully. Each entire problem is worth 33 points, and 1 point is free.

1. Consider the following system of equations

$$\begin{aligned}x_1 + 2x_2 &= 3, \\2x_1 + 4x_2 + x_3 &= 6, \\x_1 + 2x_2 + 3x_3 &= 3.\end{aligned}$$

- (a) Write down the augmented matrix for this system of equations.
- (b) Use Gaussian elimination with back substitution to transform this system of equations into reduced row echelon form. **Show your computations!**
- (c) Interpret the reduced row echelon form in terms of the solution set to the system of equations. That is,
- (i) If there are no solutions, state so.
  - (ii) If there is a unique solution, give it.
  - (iii) If there is a parametrized solution set, write it down.

2. Go through the same steps as Problem 1, but with the system of equations:

$$\begin{aligned}x_1 + 2x_2 &= 3, \\2x_1 + 4x_2 + x_3 &= 0, \\x_1 + 2x_2 + 3x_3 &= 3.\end{aligned}$$

3. Go through the same steps as Problem 1, but with the system of equations:

$$\begin{aligned}x_1 + 2x_2 &= 3, \\2x_1 + 4x_2 + x_3 &= 0, \\x_1 + &+ 3x_3 = 3.\end{aligned}$$