

This Project is due Friday, November 16<sup>th</sup>. Neatness, Completeness and Margins count. Show all work.

**Face-to-Face Students:** This Writing Project is due by the end of class, Friday, November 16<sup>th</sup>.

**Online Students:** If you can do a quality scan to a single, multi-page PDF, you may submit your work by e-mail *in the Course Shell*. Use the E-Mail link in the Main Navbar, and attach it to a message to Harry Mills. I'm not accepting submissions to my [steve.mills@aims.edu](mailto:steve.mills@aims.edu) account.

1 Solve the system of linear equations 
$$\begin{aligned} x - 3y &= -9 \\ 4x - 11y &= -32 \end{aligned}$$
 in 3 ways:

- a. (10 pts) Find the general vicinity of the solution by graphing the system. This should at least give you a general idea. Don't worry about it being super-accurate. Just graph the two lines by the intercept method. Supply the exact answer after you work parts b and c, below. Resist the temptation to use tickmarks on the horizontal and vertical axes.
- b. (10 pts) Use the Substitution Method
- c. (10 pts) Use the Elimination Method.

2. (10 pts) Use Elimination to solve the independent system of linear equations: 
$$\begin{aligned} x + 2y &= -1 \\ 3x + 7y - z &= -6 \\ -2x - 6y + 3z &= 9 \end{aligned}$$

3. Solve the dependent system of linear equations: 
$$\begin{aligned} x + 3y - 2z &= 3 \\ 3x + 7y - 7z &= 11 \\ 2x + 4y - 5z &= 8 \end{aligned}$$

- a. (10 pts) Give the general solution. Be kind to your teacher and let  $z$  be free! That means, find an expression for  $x$  and  $y$  in terms of the variable  $z$ .
- b. (10 pts) Give the particular solutions corresponding to  $z = 0$ ,  $z = 1$  and  $z = -1$ .

4. **The Underlying Assumption:** All of the techniques we learn for solving systems of linear equations are based on the *assumption* that the systems *have* solutions. So when we arrive at a false (*absurd!*) statement after a few elimination steps, the only explanation is that there was no solution in the first place\*. Our incorrect assumption\* led to something absurd, like  $0 = 10$  or  $0 = -5$ .

\*... or you made a mechanical error and should check your work, just to make sure. Stay organized and always check your work.

**Higher Learning:** In higher mathematics, this is the most basic method of proving something is false: "Assume it's true and conclude something absurd (like  $0 = 1$ )." It's important that you realize what's happening when you arrive at those absurdities at the end of a perfectly logical and legal sequence of

moves. That said, let me *finally* get to the question:

$$x + 3y - 2z = 3$$

(10 pts) **Your Task:** Show that the dependent system of linear equations  $3x + 7y - 7z = 11$

$$2x + 4y - 5z = 9$$

has no solution. I expect to see the word "absurd" in your discussion.