

This Project is due Friday, May 1st.

Early Birds: Monday, April 20th. 10% bonus for doing so, with the added benefit of getting feedback BEFORE the test. Submit a quality scan to a single, multi-page PDF. Submit your work in PDF by e-mail *in the Course Shell* to hmills1@online.aims.edu. Or snail-mail it to me at my *home address*:

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1 Solve the system of linear equations $\begin{cases} 2x + 2y = -14 \\ 3x - y = -5 \end{cases}$ in 3 ways:

- a. (10 pts) Find the general vicinity of the solution by graphing the system. This should give you a general idea. Don't worry about it being super-accurate, although the more care you take, the better the estimate will be. Just graph the two lines by the intercept method. Supply the exact answer after you work parts b and c, below. I care much more about ordered-pair labels (OPLs) than tickmarks. OPLs are required. Tickmarks are not. On a test, I'm always looking for the labels. The tickmarks are just busy work that slows you down, when you're on the clock.
- 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: $\begin{cases} x + 2y - 2z = -16 \\ x + 2y - 3z = -28 \\ 2x + 3y - z = -1 \end{cases}$

3. Consider the dependent system of linear equations: $\begin{cases} x + y - z = 2 \\ 2x + 7y - 5z = 6 \\ 7x + 22y - 16z = 20 \end{cases}$

- a. (10 pts) Use Elimination to obtain 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:

$$x + y - z = 2$$

(10 pts) **Your Task:** Show that the dependent system of linear equations $2x + 7y - 5z = 6$

$$7x + 22y - 16z = 27$$

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