MAT 1340 Writing Project #4 – Spring, 2024 Name_____
100 Points

Put your name at the top of your project.

Circle final answers.

Show all work. The easier it is to process, the more points you will earn.

(30 pts) Formatting and clarity. You know what I'm looking for.

This Project has 3 Editions: Early-Bird, On-Time, and Late.

Early Bird: Due Friday, April 19th (Upload to Early-Bird Edition in Assignments.)
On-Time: Due Monday, April 22nd (Upload to On-Time Edition…)
Late: Due Friday, April 26th (Upload to Late Edition.)

1 Solve the system of linear equations $\begin{matrix} 3x+5y=30 \\ 7x-2y=8 \end{matrix}$ 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. *x*- and *y*-intercepts 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, and slow *me* down counting tickmarks!

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: $\begin{matrix} 5x-4y-15z=-123 \\ 4x-3y-12z=-98 \\ 2x-2y-7z=-56 \end{matrix}$. Hint:

-1 Equation 2 + Equation 1 will put a nice '1' in the top-left corner, which makes the arithmetic a lot easier!

3. Consider the dependent system of linear equations: $\begin{matrix} x+2y+5z=3 \\ 2x+5y+14z=8 \\ 6x+16y+46z=26 \end{matrix}$.

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. (WebAssign always wants you to use $z = t$, but I'm fine with just using the z as the parameter.

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:

   (10 pts) **Your Task:** Show that the dependent system of linear equations
   $$\begin{aligned} x + 2y + 5z &= 3 \\ 2x + 5y + 14z &= 8 \\ 6x + 16y + 46z &= 33 \end{aligned}$$
   has no solution. I expect to see the word "absurd" in your discussion.