

The goal of this assignment is just to get you familiar with the use of technology as it pertains to Systems and Matrices. All these problems can be done using a combination of the Linear Algebra Tool Kit

<http://www.math.odu.edu/~bogacki/cgi-bin/lat.cgi> and Wofram Alpha

<http://www.wolframalpha.com/> but there are MANY other tools that can be used as well. I encourage you to explore and find tools of your own.

You do not need to produce a formal report, just turn in enough (printout of screen shots etc) so that I know you did the problems. **On each problem, state which software you used.** You must also include a **short paragraph** at the end reflecting on what you learned and briefly critiquing the software you used.

1) (Linear Systems with a Unique Solution using row operations) Learn how to enter matrices and how to find the reduced row echelon form of a matrix and then use your utility to solve the linear system in [Section 1.2 # 5](#) by reducing the augmented matrix to reduced row echelon form.

2). (Linear Systems with Infinitely Many Solutions) Technology utilities vary on how they handle linear systems with infinitely many solutions. See how your utility handles the system in [Section 1.2 #7](#).

3) (Inconsistent Linear Systems) Computer programs will often successfully identify inconsistent linear systems, but they can sometimes be fooled into reporting an inconsistent system as consistent, or vice-versa. This typically happens when some of the numbers that occur in the computations are so small that round-off error makes it difficult for the utility to determine whether or not they are equal to zero. See how your program handles this inconsistent system:
$$\begin{cases} x + 2y = 7 \\ x + 2y = 7.001 \end{cases}$$

(Just for fun.... Can you find one that fools the computer?)

4) (Matrix Operations) Learn how to perform the basic operations on matrices—addition, subtraction, multiplication by scalars, and multiplication of matrices. Then perform the following computations. Notice how your computer handles computations that where matrices are not compatible sizes.

$$(a) \begin{bmatrix} -1 & 4 \\ 2 & 0 \\ 7 & -3 \end{bmatrix} \begin{bmatrix} 3 & 9 & 7 \\ -7 & 0 & 1 \end{bmatrix} - 3 \begin{bmatrix} 0 & 1 & 1 \\ -3 & 2 & 4 \\ 1 & 5 & 9 \end{bmatrix} \qquad (b) \begin{bmatrix} 3 & 9 & 7 \\ -7 & 0 & 1 \end{bmatrix} \begin{bmatrix} -9 & 2 \\ 9 & 6 \end{bmatrix}$$

5). (Inverse) Determine how to find the inverse of a matrix, and then use your utility to find the inverses of the following matrices. Notice how your software handles a singular matrix.

$$(a) \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix} \quad (b) \begin{bmatrix} 1 & 6 & 4 \\ 2 & 4 & -1 \\ -1 & 2 & 5 \end{bmatrix}$$

6). **(Determinant)** Use your computer to compute the determinant: $\begin{vmatrix} -8 & 7 & 3 \\ 3 & \frac{1}{3} & 12 \\ -6.2 & 3 & \pi \end{vmatrix}$

What limitation does your software have regarding this problem, if any?