Systems of Equations, Matrices, Determinants

1. Solve the following system using the substitution method.

$$3x - 2y = -10$$
$$x + 5y = 8$$

2. Give an example of an inconsistent system of linear equations in two variables.
(This means that there are no solutions to the system.)

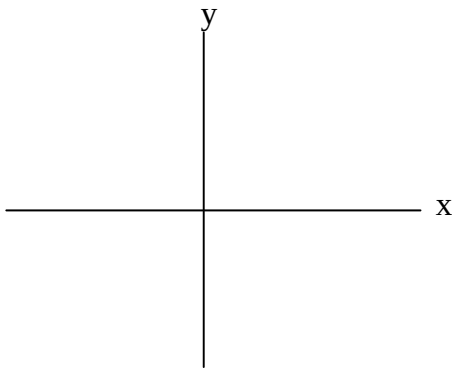
3. James decides to kayak 40 miles downstream from Austin to Smithville on the Colorado River and return upstream from Smithville to Austin on the same day. This trip will take 13 hours to complete. If James rows at a constant rate and the current also remains constant at 1.5 mph, determine his rowing speed in still water.

4. Solve the following system using Gaussian Elimination with back-substitution or Gauss-Jordan Elimination.

$$2x - 4y = -2$$
$$-3x + 6y = 3$$

5. Estimate the solution to the following system by graphing. Do not solve algebraically.

$$x^2 + y^2 = 16$$
$$x^2 + 2y = 8$$



6. Solve the following system using any method:

$$\begin{aligned} x + y + z &= 4 \\ x + 3y + 2z &= 4 \\ x - 2y + z &= 7 \end{aligned}$$

7. Suppose the equation of a certain parabola has the form $y = ax^2 + bx + c$. *Set up the equations needed* to find the values of *a, b,* and *c* if the parabola passes through the points (4,-4), (5,-5), and (7,-1). Do not solve.

8. Solve the following system:

$$\begin{aligned} x^2 + y^2 &= 10 \\ y - x &= -2 \end{aligned}$$

9. A manufacturer produces three models of a product, which are shipped to two warehouses. The number of units *i* that are shipped to warehouse *j* is represented by a_{ij} in matrix A below. The price per unit is represented by matrix B. Find the product BA and interpret the results.

$$A = \begin{bmatrix} 1000 & 3000 \\ 2000 & 4000 \\ 5000 & 8000 \end{bmatrix} \qquad B = \begin{bmatrix} \$25 & \$20 & \$32 \end{bmatrix}$$

10. Given $A = \begin{bmatrix} 0 & 5 \\ 4 & 0 \\ -1 & -2 \\ 3 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 0 & 6 \\ 1 & -1 & 0 \\ 2 & 9 & -2 \end{bmatrix}$, $C = \begin{bmatrix} -2 & 1 & 20 \\ 1 & -3 & 0 \\ 0 & 10 & 3 \end{bmatrix}$,

$$D = \begin{bmatrix} -4 & 8 & -3 & 7 \\ 3 & 0 & -2 & 9 \end{bmatrix} \text{ and } E = \begin{bmatrix} -3 & 0 \\ 5 & 2 \end{bmatrix}$$

find $A \cdot E$, if it exists.

11. Using the same matrices above, find **2B - 3C**.

12. Find the det C, if C is the matrix $C = \begin{bmatrix} -2 & 6 \\ -1 & 4 \end{bmatrix}$