Homework

Solve the system of linear equations

1. $\begin{cases} x_1 - x_2 = 0 \\ 3x_1 - 2x_2 = -1 \end{cases}$

2. $\begin{cases} 3x + 2y = 2 \\ 6x + 4y = 14 \end{cases}$

3. $\begin{cases} 3x_1 - 2x_2 + 4x_3 = 1 \\ x_1 + x_2 - 2x_3 = 3 \\ 2x_1 - 3x_2 + 6x_3 = 8 \end{cases}$

Determine the size of the matrix

4. $\begin{bmatrix} 1 & 2 & -4 \\ 3 & 4 & 6 \\ 0 & 1 & 2 \end{bmatrix}$

5. $\begin{bmatrix} 2 & 1 & -1 & -1 \\ -6 & 2 & 0 & 1 \end{bmatrix}$

Find the solution set of the system of linear equations represented by the augmented matrix.

6. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 2 \end{bmatrix}$

7. $\begin{bmatrix} 1 & -1 & 0 & 3 \\ 0 & 1 & -2 & 1 \\ 0 & 0 & 1 & -1 \end{bmatrix}$

8. Determine whether the matrix is in row-echelon form. If it is, determine whether it is also in reduced row-echelon form.

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Solve the system using either Gaussian elimination or Gauss-Jordan elimination

9. $\begin{cases} x_1 - 3x_3 = -2 \\ 3x_1 + x_2 - 2x_3 = 5 \\ 2x_1 + 2x_2 + x_3 = 4 \end{cases}$

10. $\begin{cases} 2x_1 + 3x_3 = 3 \\ 4x_1 - 3x_2 + 7x_3 = 5 \\ 8x_1 - 9x_2 + 15x_3 = 10 \end{cases}$

11. Assume that the matrix is the augmented matrix of a system of linear equations, and

$$\begin{bmatrix} 1 & k & 2 \\ -3 & 4 & 1 \end{bmatrix}$$

a) Determine the number of equations and the number of variables.

b) Find the value(s) of $\boldsymbol{k}$ such that the system is consistent.

c) Determine the number of equations and the number of variables but if the matrix is the coefficient matrix of a *homogeneous* system of linear equations.

d) Find the value(s) of $\boldsymbol{k}$ from part (*c*).

Determine the polynomial function whose graph through the points and sketch the graph of the polynomial function, showing the points.

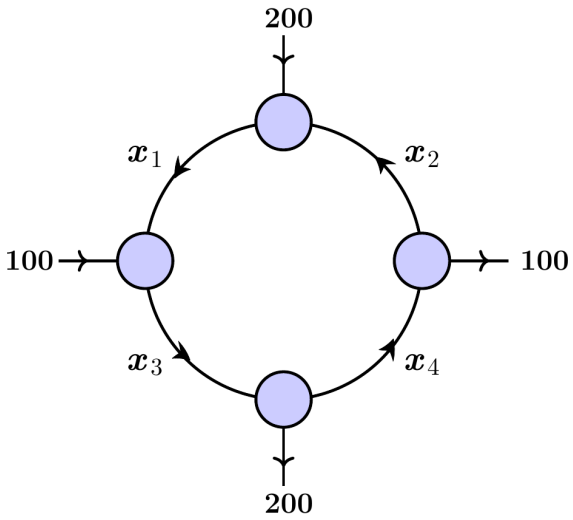
12. $(2,\ 5),\ (3,\ 2),\ (4,\ 5)$

13. $(2,\ 4),\ (3,\ 6),\ (5,\ 10)$

14. $(-1,\ 3),\ (0,\ 0),\ (1,\ 1),\ (4,\ 58)$

15. The U.S. census lists the population of the United States as 249 million in 1990, 282 million in 2000, and 309 million in 2010. Fit a second-degree polynomial passing through these three points and use it to predict the populations in 2020 and 2030.

16. The flow of traffic, in vehicles per hour, through a network of streets as is shown below



a) Solve this system for $x_i,\quad i=1,\ 2,\ 3,\ 4.$

b) Find the traffic flow when $x_4 = 0$.

c) Find the traffic flow when $x_4 = 100$.

d) Find the traffic flow when $x_1 = 2x_2$.