

## 5.2.6

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### Question:

Solve the following system of linear equations using Gaussian elimination and matrices:

$$2x - 3y = 8$$

$$4x - 6y = 9$$

### Solution:

First, we represent the system of equations as an augmented matrix.

$$\left( \begin{array}{cc|c} 2 & -3 & 8 \\ 4 & -6 & 9 \end{array} \right) \quad (1)$$

Apply the row operation  $R_2 \rightarrow R_2 - 2R_1$ :

$$\left( \begin{array}{cc|c} 2 & -3 & 8 \\ 0 & 0 & -7 \end{array} \right) \quad (2)$$

Now, we translate the second row of the resulting matrix back into an equation:

$$0x + 0y = -7 \quad (3)$$

This simplifies to the statement:

$$0 = -7 \quad (4)$$

This statement is a contradiction, as 0 is not equal -7.

Because the process leads to a contradiction, the original system of equations is described as **inconsistent**. This means there is no pair of values for  $x$  and  $y$  that can satisfy both equations simultaneously. Therefore, the system has **no solution**.

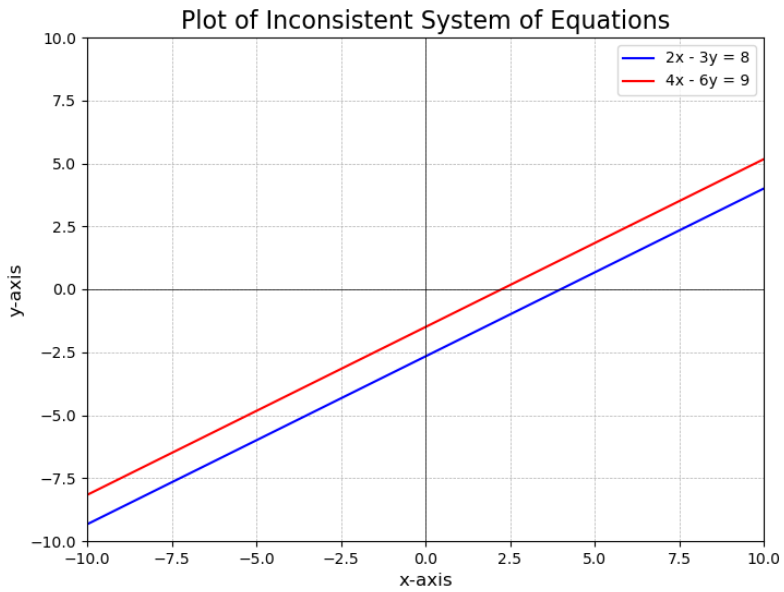
**Plot of the Lines:**

Fig. 0: Figure for 5.2.6