

12.180

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Question

The system of linear equations

$$4x + 2y = 7$$

$$2x + y = 6$$

has

a) a unique solution

b) no solution

c) infinite number of solutions

d) exactly two distinct solutions

solution:

Given linear equations are

$$(4 \quad 2) \begin{pmatrix} x \\ y \end{pmatrix} = 7 \quad (1)$$

$$(2 \quad 1) \begin{pmatrix} x \\ y \end{pmatrix} = 6 \quad (2)$$

Equations (1) and (2) can be written as

$$\begin{pmatrix} 4 & 2 \\ 2 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 7 \\ 6 \end{pmatrix} \quad (3)$$

Forming the augmented matrix

$$\left(\begin{array}{cc|c} 4 & 2 & 7 \\ 2 & 1 & 6 \end{array} \right) \xrightarrow{R_1 \rightarrow R_1 - 2R_2} \left(\begin{array}{cc|c} 0 & 0 & -5 \\ 2 & 1 & 6 \end{array} \right) \quad (4)$$

As in the augmented matrix the entries of first row are 0 their linear combination should also give 0 but it is given as -5
 \Rightarrow So, the given system of linear equations have no solution

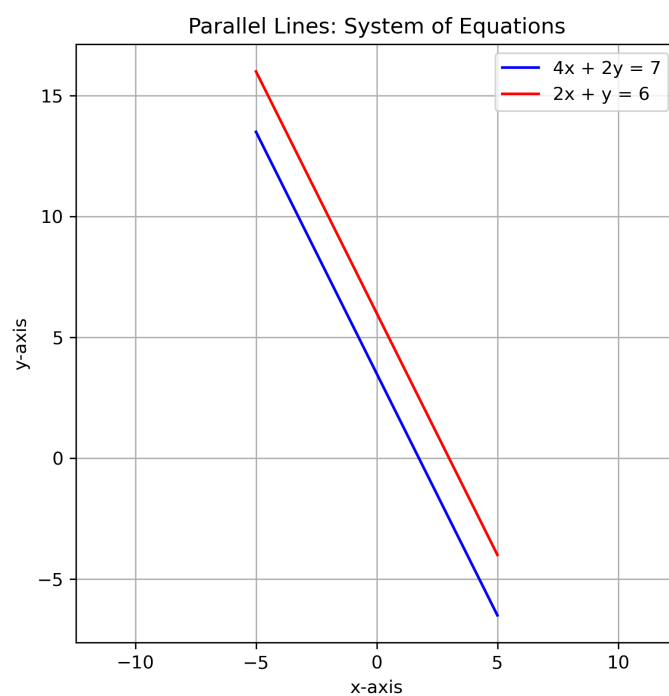


Fig. 4