5.2.13

EE25BTECH11010 - Arsh Dhoke

Question:
Solve the following system of linear equations 2x-2y=2 and 4x-4y=5.
Solution:

Description	Vector
$(\mathbf{n_1})$	$\begin{pmatrix} 2 \\ -2 \end{pmatrix}$
$(\mathbf{n_2})$	$\begin{pmatrix} 4 \\ -4 \end{pmatrix}$

We can combine and write these 2 equations as

$$\begin{pmatrix} 2 & -2 \\ 4 & -4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 5 \end{pmatrix} \tag{0.1}$$

Solving augmented matrix using gaussian elimination

$$\left(\begin{array}{cc|c} 2 & -2 & 2 \\ 4 & -4 & 5 \end{array}\right) \xleftrightarrow{R_2 \to R_2 - 2R_1} \left(\begin{array}{cc|c} 2 & -2 & 2 \\ 0 & 0 & 1 \end{array}\right) \tag{0.2}$$

The second row shows 0 = 1 which is a contradiction.
Thus this system is inconsistent with no solution.

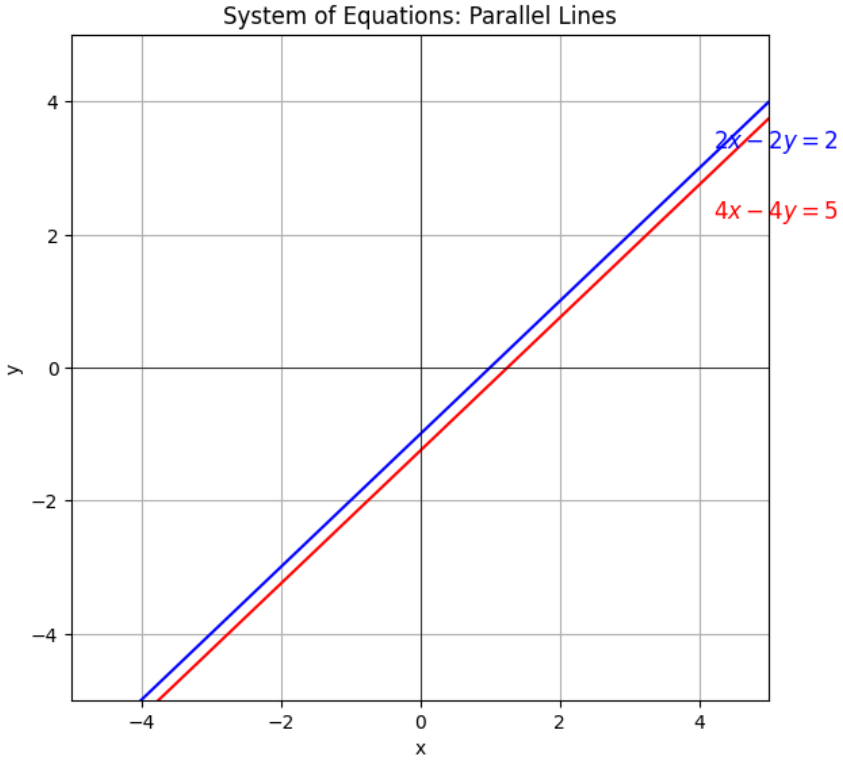
System of Equations: Parallel Lines
$2x - 2y = 2$
$4x - 4y = 5$
y
x
4
2
0
−2
−4
−4
−2
0
2
4

Fig. 0.1: Graph