5.3.17

AI25BTECH11023 - Pratik R

Question

Solve the system of linear equations using the matrix method

$$7x + 2y = 11 \tag{0.1}$$

$$4x - 7y = 2 \tag{0.2}$$

Solution:

Using augmented matrix

$$\left(\begin{array}{cc|c} 7 & 2 & 11 \\ 4 & -7 & 2 \end{array}\right) \tag{0.3}$$

Reducing it to reduced echelon form

$$\left(\begin{array}{cc|c} 7 & 2 & 11 \\ 4 & -7 & 2 \end{array}\right) \xleftrightarrow{R_2 = R_2 - R_1 \times \frac{4}{7}} \left(\begin{array}{cc|c} 7 & 2 & 11 \\ 0 & -\frac{57}{7} & -\frac{30}{7} \end{array}\right) \tag{0.4}$$

$$\xleftrightarrow{R_2 = R_2 \times \frac{14}{57}} \left(\begin{array}{cc|c} 7 & 2 & 11 \\ 0 & -2 & -\frac{60}{57} \end{array}\right) \xleftrightarrow{R_1 = R_1 + R_2} \left(\begin{array}{cc|c} 7 & 0 & \frac{567}{57} \\ 0 & -2 & -\frac{60}{57} \end{array}\right) \tag{0.5}$$

$$\xleftrightarrow{R_1 = R_1/7} \left(\begin{array}{cc|c} 1 & 0 & \frac{81}{57} \\ 0 & -2 & -\frac{60}{57} \end{array}\right) \xleftrightarrow{R_2 = R_2/-2} \left(\begin{array}{cc|c} 1 & 0 & \frac{81}{57} \\ 0 & 1 & \frac{30}{57} \end{array}\right) \tag{0.6}$$

Hence

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{57} \begin{pmatrix} 81 \\ 30 \end{pmatrix} \tag{0.7}$$

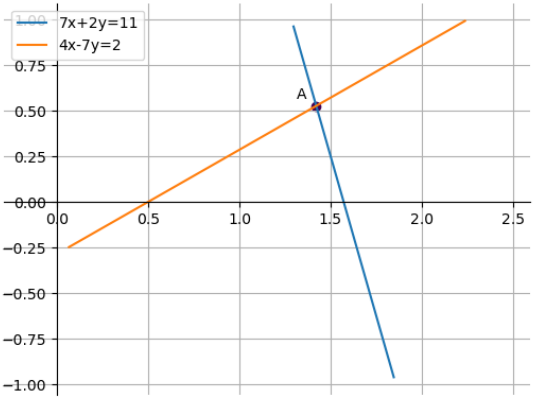
7x+2y=11
4x-7y=2
A
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0.0
0.5
1.0
1.5
2.0
2.5

Fig. 0.1: plane