5.8.38

EE25BTECH11041 - Naman Kumar

Question:
Alwar tells his daughter,"Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be" Represent this situation algebraically and graphically.

Solution:
We have,

x	age of daughter
y	age of dad

from given statements, we can write

$$y-7=7\times(x-7) \quad \& \quad y+3=3\times(x+3) \tag{1}$$

$$7x-y=42 \quad \& \quad 3x-y=-6 \tag{2}$$

This can be written as

$$\begin{pmatrix}7 & -1\\ 3 & -1\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}42\\ -6\end{pmatrix} \tag{3}$$

$$\mathbf{Ax}=\mathbf{c} \tag{4}$$

Row reduced form of $[\mathbf{A}|\mathbf{I}]$

$$\left(\begin{array}{cc|c}7 & -1 & 42\\ 3 & -1 & -6\end{array}\right)\xrightarrow{R_2-\frac{3}{7}R_1}\left(\begin{array}{cc|c}7 & -1 & 42\\ 0 & -\frac{4}{7} & -24\end{array}\right) \tag{5}$$

$$\xrightarrow{\frac{-7}{4}R_2}\left(\begin{array}{cc|c}7 & -1 & 42\\ 0 & 1 & 42\end{array}\right) \tag{6}$$

Therefore

$$\begin{pmatrix}7 & -1\\ 0 & 1\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}42\\ 42\end{pmatrix} \tag{7}$$

$$\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}12\\ 42\end{pmatrix} \tag{8}$$

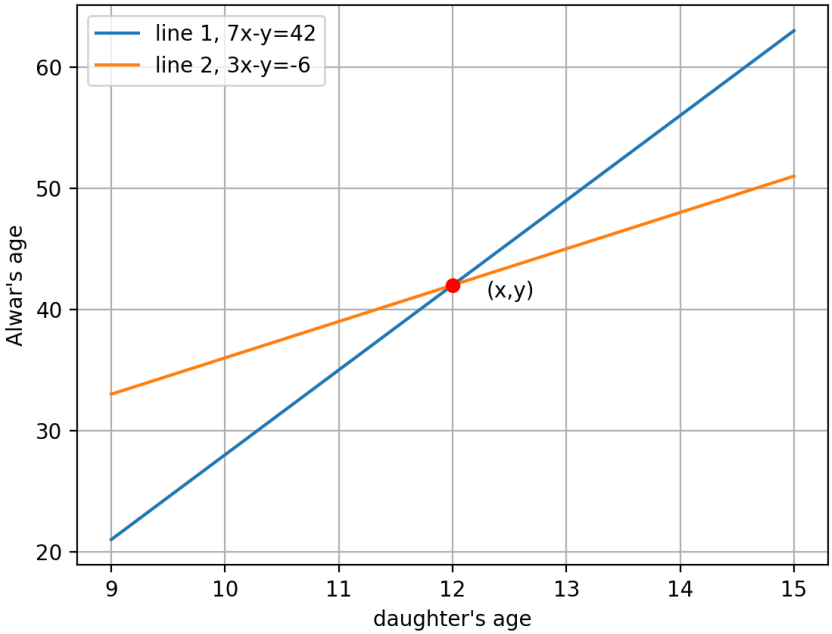
line 1, 7x-y=42
line 2, 3x-y=-6
(x,y)
Alwar's age
daughter's age
20
30
40
50
60
9
10
11
12
13
14
15

Fig. 1