5.8.10

EE25BTECH11012-BEERAM MADHURI

Question:
Narayan tells his daughter, 'Seven years ago, I was seven times as old as you were then. Also, 3 years from now, I shall be 3 times as old as you will be.' Find their ages.

Solution:
Let present age of Narayan = N and
Present age of daughter = D.
7 years ago:

$$(N-7) = 7(D-7) \tag{0.1}$$
$$N - 7 = 7D - 49 \tag{0.2}$$
$$7D - N = 42 \tag{0.3}$$

and 3 years from now:

$$(N+3) = 3(D+3) \tag{0.4}$$
$$N + 3 = 3D + 9 \tag{0.5}$$
$$3D - N = -6 \tag{0.6}$$

expressing the given information in matrix form

$$\begin{pmatrix} 7 & -1 \\ 3 & -1 \end{pmatrix} \begin{pmatrix} D \\ N \end{pmatrix} = \begin{pmatrix} 42 \\ -6 \end{pmatrix} \tag{0.7}$$

Augmented matrix:

$$\left(\begin{array}{cc|c} 7 & -1 & 42 \\ 3 & -1 & -6 \end{array}\right) \tag{0.8}$$

By row reductions:

$$\begin{pmatrix} 7 & -1 & | & 42 \\ 3 & -1 & | & -6 \end{pmatrix} \xrightarrow{R_2 \to R_2 - \frac{3}{7}R_1} \begin{pmatrix} 7 & -1 & | & 42 \\ 0 & -\frac{4}{7} & | & -24 \end{pmatrix} \tag{0.9}$$
$$as \text{rank}(A) = \text{rank}(A|b) = 2 \tag{0.10}$$

$$N = \frac{-24 \times 7}{-4} \tag{0.11}$$
$$= 42$$
$$D = 12. \tag{0.12}$$

Hence,the age of Narayan is 42, and age of his Daughter is 12.

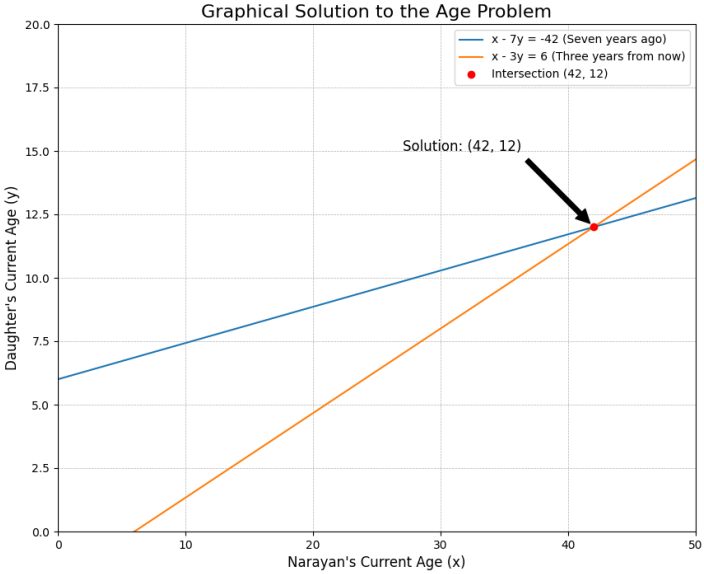
Graphical Solution to the Age Problem
x - 7y = -42 (Seven years ago)
x - 3y = 6 (Three years from now)
Intersection (42, 12)
Solution: (42, 12)
Daughter's Current Age (y)
Narayan's Current Age (x)
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
0
10
20
30
40
50

Fig. 0.1: 5.8.10