

# Assignment No.1

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Download all python codes from

[https://github.com/Abhishek7008/Assignment\\_1.git](https://github.com/Abhishek7008/Assignment_1.git)

and latex-tikz codes from

[https://github.com/Abhishek7008/Assignment\\_1.git](https://github.com/Abhishek7008/Assignment_1.git)

## 1 QUESTION No.1

The sum of the digits of a two-digit number is 12. The number obtained by interchanging the two digits exceeds the given number by 18. Find the number ? [CBSE/MATH/10/2006 set2- Q1(b)]

## 2 SOLUTION

Let the tens digit of the required number be  $a_1$  and the units digit be  $a_0$ . Then,

$$a_1 + a_0 = 12 \quad (2.0.1)$$

Required Number is

$$(10a_1 + a_0) \quad (2.0.2)$$

Which can be written in vector form as

$$\begin{pmatrix} 10 & 1 \end{pmatrix} \mathbf{x} \quad (2.0.3)$$

where

$$\mathbf{x} = \begin{pmatrix} a_1 \\ a_0 \end{pmatrix} \quad (2.0.4)$$

Number obtained on reversing the digits =  $(10a_0 + a_1)$   
Therefore,

$$\Rightarrow (10a_0 + a_1) - (10a_1 + a_0) = 18 \quad (2.0.5)$$

$$\Rightarrow a_0 - 9a_1 = 18 \quad (2.0.6)$$

$$\Rightarrow a_0 - a_1 = 2 \quad (2.0.7)$$

Solving (2.0.1) and (2.0.7), can be expressed as a Matrix Equation

$$\begin{pmatrix} 1 & 1 \\ -1 & 1 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 12 \\ 2 \end{pmatrix} \quad (2.0.8)$$

The augmented matrix for the above equation is row reduced as follows:

$$\begin{pmatrix} 1 & 1 & 12 \\ -1 & 1 & 2 \end{pmatrix} \xrightarrow{R_2 \leftarrow R_2 + R_1} \begin{pmatrix} 1 & 1 & 12 \\ 0 & 2 & 14 \end{pmatrix} \quad (2.0.9)$$

$$\xrightarrow{R_2 \leftarrow \frac{1}{2}R_2} \begin{pmatrix} 1 & 1 & 12 \\ 0 & 1 & 7 \end{pmatrix} \quad (2.0.10)$$

$$\xrightarrow{R_1 \leftarrow R_1 - R_2} \begin{pmatrix} 1 & 0 & 5 \\ 0 & 1 & 7 \end{pmatrix} \quad (2.0.11)$$

$$\Rightarrow a_1 = 5 \quad (2.0.12)$$

$$\Rightarrow a_0 = 7 \quad (2.0.13)$$

As Required Number

$$= 10a_1 + a_0 \quad (2.0.14)$$

$$= 10(5) + 7 \quad (2.0.15)$$

$$= 57 \quad (2.0.16)$$

Hence, the required number is 57.

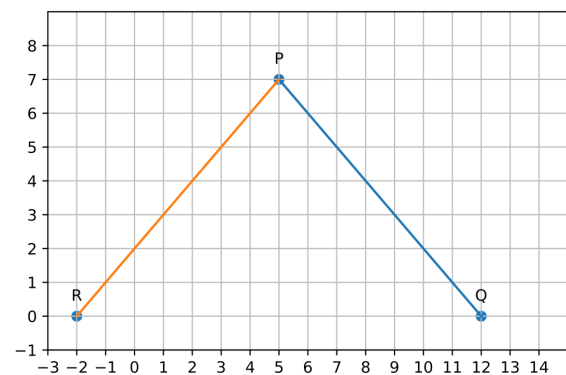


Fig. 2.1: Graphical solution

$\therefore$  This figure verifies that two lines are intersecting at one point.