Assignment No.1

Abhishek Nayak

Download all python codes from

https://github.com/Abhishek7008/Assignment_1.git

and latex-tikz codes from

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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 ?.

2 Solution

Let the tens digit of the required number be x and the units digit be y. Then,

$$x + y = 12 \tag{2.0.1}$$

Required Number $= (10x + y)$
Number obtained on reversing the digits$=(10y+x)$
Therefore,

$$\Rightarrow (10y + x) - (10x + y) = 18$$
$$\Rightarrow 9y - 9x = 18$$
$$\Rightarrow y - x = 2 \tag{2.0.2}$$

Solving 2.0.1 and 2.0.2 , can be expressed as a Matrix Equation

$$\begin{pmatrix} 1 & 1 \\ -1 & 1 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 12 \\ 2 \end{pmatrix} \tag{2.0.3}$$

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

$$\begin{pmatrix} 1 & 1 & 12 \\ -1 & 1 & 2 \end{pmatrix} \xleftrightarrow{R_2 \leftarrow R_2 + R_1} \begin{pmatrix} 1 & 1 & 12 \\ 0 & 2 & 14 \end{pmatrix} \tag{2.0.4}$$

$$\begin{pmatrix} 1 & 1 & 12 \\ 0 & 2 & 14 \end{pmatrix} \xleftrightarrow{R_2 \leftarrow \frac{1}{2} R_2} \begin{pmatrix} 1 & 1 & 12 \\ 0 & 1 & 7 \end{pmatrix} \tag{2.0.5}$$

$$\begin{pmatrix} 1 & 1 & 12 \\ 0 & 1 & 7 \end{pmatrix} \xleftrightarrow{R_1 \leftarrow R_1 - R_2} \begin{pmatrix} 1 & 0 & 5 \\ 0 & 1 & 7 \end{pmatrix} \tag{2.0.6}$$

$$\Rightarrow \mathbf{x} = \begin{pmatrix} 5 \\ 7 \end{pmatrix} \tag{2.0.7}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$$

As Required Number $(10x + y)$

$$\Rightarrow 10(5) + y = 57$$

Hence, the required number is 57.