Assignment - 1

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***Abstract*—This is a simple document to learn about writing vectors and matrices using latex, draw figures using Python, Latex.**

Download all and latex-tikz codes from

svn co https://github.com/arjunjc93/Assignment−1_new.git

1 Vectors
(CBSE-Math-X-2006-Set 1-Q.1)

1.1. Solve for x and y:

$$47x + 31y = 63 \tag{1.1.1}$$
$$or \begin{pmatrix} 47 & 31 \end{pmatrix} \mathbf{x} = 63 \tag{1.1.2}$$
$$31x + 47y = 15 \tag{1.1.3}$$
$$or \begin{pmatrix} 31 & 47 \end{pmatrix} \mathbf{x} = 15 \tag{1.1.4}$$

Solution:

a) We have two equations: Which is written in vector form:

$$\begin{pmatrix} 47 & 31 \end{pmatrix} \mathbf{Z} = 63 \tag{1.1.5}$$

and

$$\begin{pmatrix} 31 & 47 \end{pmatrix} \mathbf{Z} = 15 \tag{1.1.6}$$

where

$$\mathbf{Z} = \begin{pmatrix} x \\ y \end{pmatrix} \tag{1.1.7}$$

Both equations are written together in matrix form as:

$$\begin{pmatrix} 47 & 31 \\ 31 & 47 \end{pmatrix} \mathbf{Z} = \begin{pmatrix} 63 \\ 15 \end{pmatrix} \tag{1.1.8}$$

Augmented matrix for above is:

$$\begin{pmatrix} 47 & 31 & 63 \\ 31 & 47 & 15 \end{pmatrix} \tag{1.1.9}$$

This can be reduced as follows:

$$\begin{pmatrix} 47 & 31 & 63 \\ 31 & 47 & 15 \end{pmatrix} \overset{R_1 \leftarrow \frac{R_1}{47}}{\longleftrightarrow} \begin{pmatrix} 1 & \frac{31}{47} & \frac{63}{47} \\ 31 & 47 & 15 \end{pmatrix} \tag{1.1.10}$$

$$\overset{R_2 \leftarrow R_2 - 31R_1}{\longleftrightarrow} \begin{pmatrix} 1 & \frac{31}{47} & \frac{63}{47} \\ 0 & \frac{1248}{47} & \frac{-1248}{47} \end{pmatrix} \tag{1.1.11}$$

$$\overset{R_2 \leftarrow \frac{47}{1248}R_2}{\longleftrightarrow} \begin{pmatrix} 1 & \frac{31}{47} & \frac{63}{47} \\ 0 & 1 & -1 \end{pmatrix} \tag{1.1.12}$$

$$\overset{R_1 \leftarrow R_1 - \frac{31}{47}R_2}{\longleftrightarrow} \begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & -1 \end{pmatrix} \tag{1.1.13}$$

$$\therefore \mathbf{P} = \begin{pmatrix} 2 \\ -1 \end{pmatrix} \tag{1.1.14}$$

is the solution for x and y for the two equations.

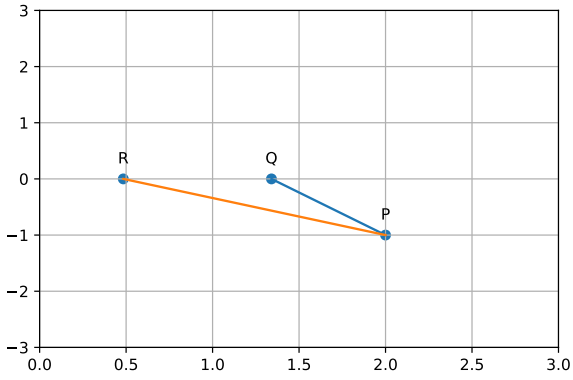

Fig. 1.1. Two lines representing given equations meet at point $\begin{pmatrix} 2 & -1 \end{pmatrix}$.