

# 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](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:

$$47x + 31y = 63 \quad (1.1.1)$$

$$\text{or } \begin{pmatrix} 47 & 31 \end{pmatrix} \mathbf{x} = 63 \quad (1.1.2)$$

$$31x + 47y = 15 \quad (1.1.3)$$

$$\text{or } \begin{pmatrix} 31 & 47 \end{pmatrix} \mathbf{x} = 15 \quad (1.1.4)$$

**Solution:**

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

$$\begin{pmatrix} 47 & 31 \end{pmatrix} \mathbf{Z} = 63 \quad (1.1.5)$$

and

$$\begin{pmatrix} 31 & 47 \end{pmatrix} \mathbf{Z} = 15 \quad (1.1.6)$$

where

$$\mathbf{Z} = \begin{pmatrix} x \\ y \end{pmatrix} \quad (1.1.7)$$

Both equations are written together in matrix form as:

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

Augmented matrix for above is:

$$\begin{pmatrix} 47 & 31 & 63 \\ 31 & 47 & 15 \end{pmatrix} \quad (1.1.9)$$

This can be reduced as follows:

$$\begin{pmatrix} 47 & 31 & 63 \\ 31 & 47 & 15 \end{pmatrix} \xrightarrow{R_1 \leftarrow \frac{R_1}{47}} \begin{pmatrix} 1 & \frac{31}{47} & \frac{63}{47} \\ 31 & 47 & 15 \end{pmatrix} \quad (1.1.10)$$

$$\xrightarrow{R_2 \leftarrow R_2 - 31R_1} \begin{pmatrix} 1 & \frac{31}{47} & \frac{63}{47} \\ 0 & \frac{1248}{47} & -\frac{1248}{47} \end{pmatrix} \quad (1.1.11)$$

$$\xrightarrow{R_2 \leftarrow \frac{47}{1248} R_2} \begin{pmatrix} 1 & \frac{31}{47} & \frac{63}{47} \\ 0 & 1 & -1 \end{pmatrix} \quad (1.1.12)$$

$$\xrightarrow{R_1 \leftarrow R_1 - \frac{31}{47} R_2} \begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & -1 \end{pmatrix} \quad (1.1.13)$$

$$\therefore \mathbf{P} = \begin{pmatrix} 2 \\ -1 \end{pmatrix} \quad (1.1.14)$$

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