### Step-1

$$\begin{pmatrix} 4 & 0 & 1 \\ 0 & 1 & 0 \\ 4 & 0 & 1 \end{pmatrix} \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 4.3 + 0.4 + 1.5 \\ 0.3 + 1.4 + 0.5 \\ 4.3 + 0.4 + 1.5 \end{pmatrix}$$

$$= \begin{pmatrix} 17 \\ 4 \\ 17 \end{pmatrix}$$

In the resultant matrix the entry 17 is 4(3)+0(4)+1(5),

The entry 4 is 0(3)+1(4)+0(5) and

The entry 17 is 4(3)+0(4)+1(5)

That means row times column is the resultant matrix.

#### Step-2

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix} = \begin{pmatrix} 1.5 + 0. - 2 + 0.3 \\ 0.5 + 1. - 2 + 0.3 \\ 0.5 + 0. - 2 + 1.3 \end{pmatrix}$$

$$=$$
 $\begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix}$ 

In the resultant matrix the entry 5 is 1(5)+0(-2)+0(3),

The entry -2 is 0(5)+1(-2)+0(3) and

The entry 3 is 0(5)+0(-2)+1(3)

That means row times column is the resultant matrix.

#### Step-3

To compute  $\begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$  draw the column vectors (2,1) and (0,3)

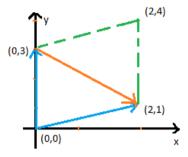
Multiplying by  $(1,1)_{to get} (2.1,1.1) = (2,1)$  and

$$(0.1,3.1) = (0,3)$$

Now by adding these two we get (2,1)+(0,3)=(2,4)

## Step-4

This is shown graphically below.



# Step-5

With sides (2,1) and (0,3), the parallelogram goes to (2,4).