## Step-1

$AB$ can be expresses as

$$AB = I(AB)$$

$$= (B^{-1}B)(AB)$$

$$= B^{-1}(BA)B$$

Therefore *AB* is similar to *BA*.

Similar matrices have the same eigen values.

## Step-2

Through another view, suppose *x* is the eigen vector corresponding to the eigen value $\lambda$ of *AB*.

Let us take $(AB)x = \lambda x$

$$\Rightarrow (B^{-1}(BA)B)x = \lambda x$$

$$\Rightarrow (BA)Bx = \lambda(Bx)$$

The eigen value of *BA* is also $\lambda$ and the respective eigen vector is *Bx*.

Therefore $AB$ and $BA$ have the same eigen values.