

## Step-1

Given that the product  $(AB)C$  of linear transformations starts with a vector  $x$  and produces  $u = Cx$

Therefore,

$$((AB)C)x = (AB)(Cx)$$

$$= (AB)u$$

$$= A(Bu)$$

Therefore, the given statement is true.

## Step-2

a) We have to verify that the result is same as separately applying  $C$  then  $B$  then  $A$ .

Yes, because

$$((AB)C)x = (AB)(Cx)$$

$$= (AB)u$$

$$= A(Bu)$$

## Step-3

b) We have to verify that is the result same as applying  $BC$  followed by  $A$ .

Yes, because we don't need parentheses  $(AB)C = A(BC)$  for  $ABC$ .