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 donâ€™t need parentheses $(AB)C = A(BC)$ for ABC.