

$A - \text{symmetric} \Rightarrow A = A^T, B - \text{symmetric} \Rightarrow B = B^T,$

$AB - \text{symmetric} \Rightarrow (AB)^T = AB,$

if A and B commute, we have : $AB = BA$

So, $(AB)^T = B^T A^T = BA = (\text{if A and B commute}) = AB$