LCME, Russia, Saint-Petersburg, Problem 6.

1) Can the pattern
   2134n-1   n
   2345n   1
   be obtained from the pattern
   2314n   n
   2345n   1
   using the operations A and B?

   Let's equate operation A this way: it compares to (α,β)(αβ,β), where α,β – some rearrangements of 1…n. B compares to (α,β)(α,βα).
   Let's equate 2 3 4 1 … n-1 n to a rearrangement (1 2); 2 3 4 … n 1 to rearrangement (1 2 … n); 2 3 1 4 … n – to (1 2 3).
   (?) ((1 2 3), (1 2 … n))→((1 2),(1 2 … n)).
   B changes only the parity of second rearrangement. B*B, operating on the second component of the pair, is 1 of group of rearrangements. So using B is not useful.
   We can get rearrangement, in which 1 turns to 2, by operation A only using it n times. But A*A*…*A n times, is 1 of group of rearrangements and first component won't change. So we can't obtain second pattern from first using A and B.