Task 1 Solution

For this task we have 12!/(6!*6!) = 924 possible different initial arrangements. Therefore, let's consider counterexample cases and logical reasoning for eliminating possible k values. One of the possible arrangements is ABABABABABAB, and in this case for k =1,12 we will never achieve the goal, as no matter how many times we move them into the right end the state is not changing => k $\notin 1{,}12.$ Next possible case is AAABBBAAABBB, which eliminates the possible values of k = 1-3, 10-12, as again no matter how many times we move them into right, we will not achieve the goal. Next case is AAAAABABBBBB, which eliminates the possible values of k = 8-12, as no matter how many times we move the B group into end, nothing is going to change.

Therefore, we are left with k ∈ [4-7], and there is not a single counterexample for this. Previously, I provided some symmetric cases, such as single repetition of all leters (ABABABABABAB) eliminates the k edge possible values(1,12), three letter repetition (AAABBBAAABBB) eliminates the edge three values (1-3, 10-12), and symmetric case of (AAAAABABBBBB) eliminates k = 8-12, however because of the nature of the problem we can't find some symmetric case that would further eliminate values 4-7, as there is no such case that leads into an infinite loop as the previous ones. Hence the final answer is k ∈ [4-7].