1) (10 pts) ANL (Algorithm Analysis)

Consider the following problem:

Given two input values, ***n*** and ***k***, determine the number of strings of length ***n***, which only contains A's and B's, that have a run of ***k*** or more consecutive B's.

One algorithm to solve the problem is as follows:

Recursively generate each possible string of ***n*** letters, each A's and B's. These can be generated in alphabetical order, never storing more than 1 of the strings at the same time.

For each string generated, loop through the string from left to right, keeping a running tally of the current number of B's. (For example, with the string ABBABBBAAB, the running counter would update as follows 0 → 1 → 2 → 0 → 1 → 2 → 3 → 0 → 0 → 1.) If this running tally ever equals or exceeds ***k***, add 1 to a global counter storing the final result. For simplicities sake, assume that the loop completes going through the whole string before 1 is potentially added to the global counter.

With proof, determine the Big-Oh runtime of this algorithm in terms of the input parameter, ***n***.