Subsets of Subsets

Consider the set \([n] = \{1, 2, 3, \ldots, n\}\). It is fairly easy to see that there are \(2^n\) different subsets \(B \subseteq [n]\). For each such subset, we can also count the number of subsets \(A \subseteq B\), which will be \(2^k\) where \(k\) is the size of \(B\). We would like to combine these to count the number of pairs \((A, B)\) such that \(A \subseteq B \subseteq [n]\).

**The Challenge:** Find an elegant formula for the number of pairs \((A, B)\) of subsets of \([n]\) with \(A \subseteq B \subseteq [n]\). Bonus, express this formula in as many ways as possible, and explain why they all make sense.

Submit solutions to Ross 2239G or oscar.levin@unco.edu by **Friday, September 29**.

The best solution will WIN A PRIZE!
Prizes include nifty Rubik’s style puzzle cubes, math puzzle books, math games, even a math coloring book. So submit your answer TODAY!