Math Challenge Problem

for September 2017

Subsets of Subsets

$$A \subseteq B \subseteq [n]$$

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!