Inclusion / Exclusion Principle

To calculate the size of

$$A_1 \cup A_2 \cup \ldots \cup A_n,$$

First calculate the sizes of *all possible* intersections of sets from

$$\{A_1, A_2, \ldots, A_n\},$$

then for all of the intersections involving an odd number of the sets add the sizes, and for all of the intersections involving an even number of the sets subtract the sizes.