

1. How many subsets of $\{a, b, c, d, e, f, g\}$ contains a or g?

$$\text{Total subsets of } \{a, b, c, d, e, f, g\} = 2^7 = 128$$

$$\text{Number of subsets of } \{b, c, d, e, f\} = 2^5 = 32$$

$$\text{Number of subsets containing a or g} = 128 - 32 = 96$$

2. How many subsets of $\{a, b, c, d, e, f, g\}$ contains at most 3 elements?

$$\binom{7}{0} + \binom{7}{1} + \binom{7}{2} + \binom{7}{3} = 1 + 7 + 21 + 35 = 64$$

3. A dinner allows you to select from five appetizers, three salads, four entrees, and three beverages. How many different dinners are there if you may have an appetizer or a salad but not both?

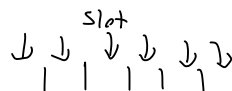
$$\begin{aligned} \text{Answer} &= \text{with appetizer} + \text{with salad} = (5 \cdot 4 \cdot 3) + (3 \cdot 4 \cdot 3) \\ &= 60 + 36 = 96 \end{aligned}$$

4. 10 students. How many ways to form a party planning committee? Each student can be in or out of the committee.

$$2^{10} = 1024$$

5. How many permutations of letters A B C D E F G H contain a substring ABC.

Obj to insert separator



$$5! \cdot 6 = 6! = 720$$

6. Suppose that there are eight runners in a race. The winner receives a gold medal, the second-place finisher receives a silver medal, and the third-place finisher receives a bronze medal. How many different ways are there to award these medals, if all possible outcomes of the race can occur?

$$P_{8,3} = \frac{8!}{(8-3)!} = 8 \cdot 7 \cdot 6 = 336$$