Counting

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Complement Principle

To count the elements in a set A, find $|\overline{A}|$

Suppose I roll a red and blue dice!

In how many outcomes the dice show different values?

A_i = set of outcomes with

red die shows i and the blue die shows something else

S = set of outcomes where the dice show different values

$$|S| = \left|\bigcup_{i=1}^{6} A_i\right| = \sum_{i=1}^{6} |A_i| = \sum_{i=1}^{6} 5 = 30$$

Complement Principle

To count the elements in a set A, find $|\overline{A}|$

Suppose I roll a red and blue dice!

In how many outcomes the dice show different values?

S = set of outcomes where the dice show different values

B = set of outcomes where the dice agree

$$|S| = 36 - |B|$$

$$|S| = 36 - 6 = 30$$

Complement Principle

ICP 11-10 How many 5 digits postal codes are there with at least one repetition?

How many 5 digits postal codes are there?

$$(10)^5$$

How many 5 digits postal codes are there with no repetition?

$$10 \cdot 9 \cdot 8 \cdot 7 \cdot 6$$

$$\left|\text{All codes}\right| - \left|\text{codes with no repetition}\right|$$

$$\underbrace{10^5}_{\text{All}} - \underbrace{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}_{\text{codes with no repetition}}$$