

## Very basic counting

In analyzing the running time of an exhaustive search strategy, you need to be able to *count* the number of objects in a set.

Example: Let  $S = \{1, 2, \dots, n\}$ .

- ▶ How many subsets are there of  $S$ ? (Equivalently, what is  $|\mathbb{P}(S)|$ , where  $\mathbb{P}(S)$  denotes the power set of  $S$ , i.e., the set of all subsets of  $S$ ?)
- ▶ How many non-empty subsets are there of  $S$ ?
- ▶ How many subsets are there of  $S$  that contain 1?
- ▶ How many subsets are there of  $S$  that do not contain 1?
- ▶ How many subsets are there of  $S$  that contain 1 and 2?
- ▶ How many subsets are there of  $S$  that do not contain 1 or 2?
- ▶ How many ways can we order the elements of  $S$ ?