256 Problem of the Week Week 3
Professor Duke

Seemingly Simple Subsets

Recall that by definition, a set S is said to be a subset of another set U if and only if the intersection, $S \cap U = S$. For instance, the set $S = \{1, 2\}$ is a subset of $U = \{1, 2, 3, 4\}$ as the elements $1, 2 \in S$ are also elements of U, hence the intersection of the two sets is S. Take notice that our definition of a set is not restricted to a proper subset, that is for any set U, $U \subseteq U$ and that our definition of subset implies that the empty set is a subset of every set. Recall also that the cardinality, or size, of a set S, denoted $|S|$, is defined as the number of elements contained within the set. For example, the set $\{4, 1, 2\}$ has cardinality $|\{4, 1, 2\}| = 3$. Your task is simple: given a set, output the number of subsets of a certain cardinality.

As a hint, consider this:

> To iterate is human, to recurse, divine.
>
> -L. Peter Deutsch

Input

Input will consist of two lines. The first line will be a set U ($2 \leq |U| \leq 15$) of comma seperated integers (no spaces after commas) surrounded by brackets. The second line will contain a single integer n.

Output

You are to output a single integer representing the number of subsets of U with cardinality n. More formally, you are to output the integer $|\{S \subseteq U : |S| = n\}|$.

Sample Input 1

$\{1, 2, 3\}$
2

Sample Output 1

3

Sample Input 2

$\{1, 2, 3, 4\}$
2

Sample Output 2

6

Sample Input 3

$\{1, 2, 3, 4, 5, 6\}$
6

Sample Output 3

1

Sample Input 4

$\{1, 2, 3, 4, 5, 6\}$
0

Sample Output 4

1

Explanation for Sample Input 1:

Listing out all subsets of the set $\{1, 2, 3\}$, we have: $\{\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}$, $\{1, 2, 3\}$. Take notice that their are 2^c subsets of a set with cardinality c - our set has eight subsets total. We output a 3 as their are 3 subsets out of the eight with exactly 2 elements -namely $\{1, 2\}, \{1, 3\}, \{2, 3\}$.