
Two coins of each kind (1)

P62113_en

Examen parcial d'Algorísmia, FME (2014-11-14)

Given a natural number x and n different coin values $c_1 \dots c_n$, compute in how many ways it is possible to achieve change x by using each value at most twice. Here, two coins with the same value are considered different.

For example, if $x = 4$ and the available values are 1 and 2, then there are three ways to achieve it: $1 + 1' + 2$, $1 + 1' + 2'$, and also $2 + 2'$.

Input

Input consists of several cases. Every case begins with x and n , followed by $c_1 \dots c_n$. Assume $1 \leq n \leq 20$, $1 \leq c_i \leq x \leq 1000$, and that all c_i are different.

Output

For every case print, in lexicographic order, all possible ways to exactly achieve change x by using each value at most twice. Print every solution with its values sorted from small to big. In doing that, assume $1 < 1' < 2 < 2' < \dots$. Use "1p" to print 1', etcetera. Print a line with 10 dashes at the end of every case.

Hint

A simply pruned backtracking should be enough.

Sample input

```
4 2 1 2
400 1 200
400 1 300
5 3 4 2 1
5 5 1 2 3 4 5
```

Sample output

```
4 = 1 + 1p + 2
4 = 1 + 1p + 2p
4 = 2 + 2p
-----
400 = 200 + 200p
-----
5 = 1 + 2 + 2p
5 = 1 + 4
5 = 1 + 4p
5 = 1p + 2 + 2p
5 = 1p + 4
5 = 1p + 4p
-----
5 = 1 + 1p + 3
5 = 1 + 1p + 3p
5 = 1 + 2 + 2p
5 = 1 + 4
5 = 1 + 4p
5 = 1p + 2 + 2p
5 = 1p + 4
5 = 1p + 4p
5 = 2 + 3
5 = 2 + 3p
5 = 2p + 3
```

$$\begin{aligned} 5 &= 2p + 3p \\ 5 &= 5 \end{aligned}$$

$$\begin{array}{|l} 5 = 5p \\ \hline \end{array}$$

Problem information

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