

Help IBM research's puzzlemaster to verify solutions for [May 2018's challenge](#).

There are  $N$  coins, represented by the first  $N$  capital letters of the English alphabet. Exactly two of them are counterfeit and have a slightly smaller weight.  $M$  weightings using a double-pan balance scale have been performed, but they may not uniquely determine the pair of counterfeit coins.

Find all counterexamples of two pairs of coins  $((a, b), (c, d))$  ( $a < b$ ,  $a \leq c$ ,  $c < d$ ,  $(a, b) \neq (c, d)$ ) whose weights are indistinguishable with respect to the  $M$  weightings.

## Standard input

The first line contains two comma separated integers,  $N$  and  $M$ .

The next  $M$  lines contain two strings of disjoint subsets of the first  $N$  English capital letters, separated by a - sign.

There always is an equal amount of coins on both sides.

## Standard output

List of lexicographically ordered counterexamples for the solution.

Each of them consists of two letters, an = sign and then another two letters.

A counterexample is a set of two pairs that cannot be distinguished by the set of  $M$  weightings.

## Constraints and notes

- $0 \leq M \leq 10$
- $2 \leq N \leq 26$
- The counterexamples should be formed using only the first  $N$  letters

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Input	Output	Explanation
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Input	Output	Explanation
<div> 11, 4  ABCDE - FGHIJ  AHJ - FBD  AGI - KCE  BJ - IE </div>	<div> AC=AK  AG=AH  BC=BK  BE=CD  BE=DK  BH=BJ  BH=DJ  BI=DG  BJ=DJ  CD=DK  CE=EK  CG=DH  CH=EJ  CI=EG  CI=EI  EG=EI  FH=GK  GH=IJ </div>	<p>In the first weighting we are comparing <code>ABCDE</code> on the left pan and <code>FGHIJ</code> on the right; on the last weighting we compare <code>BJ</code> on the left with <code>IE</code> on the right. In the answer we give all the cases where the proposed solution does not work. For example the last line ( <code>GH = IJ</code> ) means that we can not distinguish between the case where <code>G</code> and <code>H</code> are counterfeited and the case where <code>I</code> and <code>J</code> are counterfeited. The reason is that in both cases the four results of the four weightings are the same:</p> <ul style="list-style-type: none"> <li>• <code>ABCDE &gt; FGHIJ</code></li> <li>• <code>AHJ &lt; FBD</code></li> <li>• <code>AGI &lt; KCE</code></li> <li>• <code>BJ = IE</code></li> </ul>

Input	Output	Explanation
<div>15, 5 ABCDE - FGHIJ ACEGI - BDFHJ ABCKL - FDEMNI EGBH - IJLMN DEGKL - FMIBC</div>	<div>AB=BC AE=EK AF=CF AH=BG AI=CI AM=CM AM=CN BM=BN CM=CN DG=EH FH=FO FJ=FM FJ=FN FJ=JM FK=HJ FK=JO FM=FN FM=JM FN=JM HJ=JO IK=IL IM=IN JK=JL KM=LM KN=LN</div>	<div>The first line in the solution ( <math>AB = BC</math> ) is because<ul style="list-style-type: none"><li>• <math>ABCDE &lt; FGHIJ</math></li><li>• <math>ACEGI = BDFHJ</math></li><li>• <math>ABCKL &lt; FDEMNI</math></li><li>• <math>EGBH &lt; IJLMN</math></li><li>• <math>DEGKL &gt; FMIBC</math></li></ul></div>
<div>7, 3 ADE - BCG AG - BE AC - DG</div>	<div></div>	<div>This solution is correct so there is no counterexample.</div>