Day 2 – Problem 1 – The cure

The Institute for hydrobiology in Ohrid works on making some genetically modified trout spices. But something got seriously wrong, so they want to get back to the original trout. They can do this by applying special drugs to the cells. A drug can be applied only if some characteristics of the cell are present and other are absent. The drugs itself are not perfect also. They enable some characteristics, but disable others. Consider that there are n characteristics to be modified. There are m drugs to do that. Applying a drug takes some time. If needed, some drug can be applied more then once. Your task is to find out if there is a possibility to **disable all** the cell characteristics using some sequence of drugs,

Input

First line contains two integers $1 \leq n \leq 20$ and $1 \leq m \leq 100$, the number of characteristics and drugs, respectively. This is followed by m lines describing the m drugs. Each line contains an integer $0 < t < 30000$, the time in seconds it takes to apply the drug, and two strings of n characters each. The first of these strings describes the characteristics that have to be enabled or disabled before the drug can be applied. The i-th position of that string is a "+" if characteristic c_i has to be enabled, a "-" if c_i has to be disabled, and a "0" if it doesn't matter whether the characteristic is enabled or not. This means that you start with "++…+" and you must achieve "--…-".

The second string describes which characteristics are enabled and disabled by the drug. The i-th position of that string is a "+" if characteristic c_i is enabled by the patch, a "-" if c_i is disabled by the drug (if it was enabled before), and a "0" if c_i is not affected by the drug (if it was enabled before, it still is, if it wasn't, is still isn't).

Output

The output is one integer number – the shortest time to convert all '+' to all '-' if there is such a sequence of drugs, or the number -1 otherwise.

Example

Input	Output
3 3 1 000 00- 1 00- 0-+ 2 0-- -++	8
Input	Output
4 1 7 0-0+ ----	-1

Explanation for the first input case:

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+++ using drug 1 becomes ++- (1 time unit)
++- using drug 2 becomes +-+ (1 time unit)
+-+ using drug 1 becomes +-- (1 time unit)
+-- using drug 3 becomes -++ (2 time unit)
-++ using drug 1 becomes -+- (1 time unit)
-+- using drug 2 becomes --+ (1 time unit)
--+ using drug 1 becomes --- (1 time unit)
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