

**British Informatics Olympiad Final**  
6–8 April, 2001  
Sponsored by Data Connection & e-competitions

**Code Book — Bonus Question**

Rather than encoding entire words for office memos, it was decided to encode the individual characters. The letters from A to Z have been encoded so that the encoding is unambiguous, lexicographic order is maintained and the encoding is optimal. No other characters are encoded.

Spies have broken into Alpha complex and are trying to determine the encoding; fortunately for them they have found a memo in both its encoded and unencoded form. Write a program that, given an encoded and unencoded version of a memo, determines the encoding of as many letters as possible. *Note that the ‘optimal’ condition is over all the memos, not just the stolen one.*

The first line of the input will consist of a string containing the unencoded version of the memo; it will consist of between 1 and 50 (inclusive) upper case characters. The remaining lines will consist of the memo encoding; this may be broken over multiple lines (none of which will have more than 70 digits) — you should ignore anything other than 0s and 1s. The encoding will be terminated with a line containing the single number -1.

For each unique character in the unencoded memo, as well as any others you can deduce fully, you should output a single line; the character followed by its encoding. Your solution must be consistent with the three conditions as well as the memo.

**Sample Input**

```
BIGG
010101110001000
-1
```

**Sample Output**

```
B 010
G 1000
H 10010
I 10011
```