

**STA Online Computer Programming Contest (DWITE)  
December 2003**

**Problem 4**

**XOR Cryptology**

One method of encoding and decoding involves the use of a slight variation on the XOR function. Let's look at an example using the message "HI".

**Encoding**

The ASCII code for "H" is 72 = 01001000 and the ASCII code for I is 73 = 01001001.

We select a key which is 8 bits. Let the key in this case be 01101101.

The XOR cryptology function has the property that the 0's leave their corresponding bits unchanged and the 1's reverse theirs.

Therefore, "H" XOR key = 01001000 XOR 01101101 = 00100101

and "I" XOR key = 01001001 XOR 01101101 = 00100100

So, "HI" encrypted using the XOR cryptology function and the above key is 00100101 00100100.

**Decoding**

The exact same operation is used to decode.

00100101 XOR 01101101 = 01001000 = "H"

00100100 XOR 01101101 = 01001001 = "I"

The input file (DATA4) will contain five sets of data. Each set will contain two lines. The first line will contain a single character, the decoded first character of the encrypted message. The second line will contain the encrypted message. The encrypted message will contain groups of 8 bits separated by a single space. There will be at least one group of 8 bits and no more than 100 groups.

The output file (OUT4) will contain five lines of data, corresponding to each set of the input file. Each line will contain the decoded message.

**Sample Input (Only two sets given. Note: the encrypted message of the second set is actually one line)**

```
H
01001000 01001001
H
10001011 10100110 10101111 10101111 10101100 11100011 10000111
10010100 10001010 10010111 10000110
```

**Sample Output**

```
HI
Hello DWITE
```