



Problem of the Week

Problem A and Solution

The Keys to Hidden Messages

Problem

There are many ways to encode messages. Here is an encoding using just zeros and ones.

0 0 0 1 1 0 0 1 0 1 1 0 1 1 1 0

This single sequence could represent many different messages. To decode the information correctly, you need a key. The actual message that the encoding represents depends on the key you use to decode it.

Here are two keys which could be used to decode the message:

Alpha Key	
Letter	Code
C	1 0 0
D	1 0 1 0
E	0 1
O	1 1 1
R	1 0 1 1
S	0 0
T	1 1 0

Beta Key	
Letter	Code
C	0 0 0 1
D	0 1 1 0
E	1 1 1 0
O	1 0 0 1
R	1 0 1 0
S	0 1 0 1
T	1 0 1 1

- (a) What is the message if you decode it using the **Alpha Key**?
- (b) What is the message if you decode it using the **Beta Key**?

Solution

We can use pattern matching to decode the message with each key.

- (a) The first row of the following table contains the message broken up into six pieces. Notice that each of these pieces is a code in the Alpha Key. The second row of the table contains the letter corresponding to each code.

0 0	0 1	1 0 0	1 0 1 1	0 1	1 1 0
S	E	C	R	E	T

Therefore, the message is “SECRET” when decoded using the Alpha Key.

- (b) The table below was created using a similar process as in part (a), except instead for the Beta Key.

0 0 0 1	1 0 0 1	0 1 1 0	1 1 1 0
C	O	D	E

Therefore, the message is “CODE” when decoded using the Beta Key.