



Compression (LZW and Huffman)

Huffman

A Huffman table maps 'a' to 00, 'e' to 10, 'l' to 01, and 'p' to 11.

What is the message for 0011110110:

A Huffman table maps 'e' to 00, 'l' to 010, 'p' to 011, 'h' to 100, 'a' to 101, 'n' to 110, and 't' to 111.

For a word of 'elephant', what is the code:

For a sequence of "**peter piper picked a picked pepper**", determine a Huffman code for the result. Check this against:

<http://asecuritysite.com/comms/huff?text=peter%20piper%20picked%20a%20picked%20pepper>

Outline your code:

The analysis of football results gives:

"34 '1 goal', 21 '0 goals', 15 '2 goals', 14 '3 goals', 5 '4 goals', 2 '5 goals', 1 '6 goals'"

Using Huffman, determine a binary code for the goals scored and compare your code with the analysis at:

<http://asecuritysite.com/comms/huff>

Outline your code:

An intelligence agency has picked up the following binary message:

```
01100011001100010001110000011011110111010010110010100001
0011101011010011100101110001111111110010111100001111111
01000001100110111011110000110011001011001110101101111111
011011000101100101000010011101000110111111110001010010101
10111010010010111110101110000110000010101110110100010110
10100110111110010100001001110011011010011111101000000011
00110101010011111111101000101101011110001010110100111010
11101101000101100111001011100110001111001100001010100011
00111001011110011001001010000100111110010100101011001100
11001111101101001100001111111010111000011000001010101100
11101
```

and which has the following Huffman table:

Symbol	Huffman Code
	110
t	010
a	0111
e	1001
n	0010
o	1010
r	1111
s	1011
c	00001
d	11100

h	10000
i	11101
k	00010
p	00011
u	00110
m	100011
x	000000
y	000001
'	0011100
.	0011101
3	0011110
A	0011111

C	0110000
D	0110001
E	0110010
L	0110011
N	0110100
S	0110101
X	0110110
f	0110111
l	1000100
w	1000101

Can you determine the first line of the message:

LZW

For the sequence of “Cows graze in groves on grass which grows in grooves in groves”, create a possible LZW code for the message. Compare the result with:

<http://asecuritysite.com/comms/lz?text=Cows%20graze%20in%20groves%20on%20grass%20which%20grows%20in%20grooves%20in%20grooves>

Outline your code:

Intelligence sources have captured the following message, and think it is encoded with LZW compression:

```
[ 'S' , 'i' , 'n' , 'c' , 'e' , 't' , 'h' , 'e' , 'n' , 'E' ,  
262, 'e' , 'r' , 'n' , 'e' , 't' , 261, 'e' , 'c' , 'h' , 'n' , 'o' , 'l' ,  
'o' , 'g' , 'y' , 'h' , 'a' , 's' , 'e' , 'v' , 280, 'v' , 'e' ,  
'd' , 261, 'o' , 'm' , 'e' , 273, 'w' , 'b' , 'a' , 'n' ,  
' , 'd' , 'w' , 'i' , 'd' , 262, ' , 307, 295, 'm' , 'a' , 'r' , 'k' , 30  
1, 'r' , 'e' , 'q' , 'u' , 'i' , 322, 299, 'n' , 't' , 's' , 'I' ,  
' , 'n' , 314, 'd' , 'd' , 'i' , 't' , 'i' , 'o' , 335, 't' , 297, 'c' , 'I' ,  
o' , 'm' , 'p' , 'u' , 't' , 270, 's' , 266, 268, 263, 271, 301, 'i' ,  
288, 279, 304, 'u' , 's' , 294, 296, ' , 257, 351, 'r' , 346, 'n' ,  
272, 'c' , 274, 'a' , 'p' , 'p' , 'l' , 'i' , 307, 259, 288, 315, ' ,  
'o' , 269, 'r' , ' , 'p' , 352, 342, 'a' , 'l' , ' , 'd' , 290, 'i' , 3  
82, ' . ' ]
```

and the table is:

[256] Si	[261] t	[266] ,
[257] in	[262] th	[267] E
[258] nc	[263] he	[268] Et
[259] ce	[264] en	[269] the
[260] e	[265] n,	[270] er

[271] rn	[313] th	[355] Eth
[272] ne	[314] a	[356] her
[273] et	[315] and	[357] rne
[274] t	[316] dm	[358] eti
[275] te	[317] ma	[359] is
[276] ec	[318] ar	[360] sn
[277] ch	[319] rk	[361] now
[278] hn	[320] ke	[362] wu
[279] no	[321] etr	[363] us
[280] ol	[322] re	[364] se
[281] lo	[323] eq	[365] ed
[282] og	[324] qu	[366] to
[283] gy	[325] ui	[367] i
[284] y	[326] ir	[368] int
[285] h	[327] rem	[369] ter
[286] ha	[328] men	[370] rc
[287] as	[329] nt	[371] con
[288] s	[330] ts	[372] nn
[289] e	[331] s.	[373] nec
[290] ev	[332] .	[374] ct
[291] vo	[333] I	[375] ta
[292] olv	[334] In	[376] ap
[293] ve	[335] n	[377] pp
[294] ed	[336] ad	[378] pl
[295] d	[337] dd	[379] li
[296] to	[338] di	[380] ia
[297] o	[339] it	[381] anc
[298] m	[340] ti	[382] ces
[299] me	[341] io	[383] sa
[300] ee	[342] on	[384] and
[301] et	[343] nt	[385] o
[302] n	[344] to	[386] ot
[303] new	[345] oc	[387] ther
[304] w	[346] co	[388] r
[305] b	[347] om	[389] p
[306] ba	[348] mp	[390] pe
[307] an	[349] pu	[391] erso
[308] nd	[350] ut	[392] ona
[309] dw	[351] te	[393] al
[310] wi	[352] ers	[394] l
[311] id	[353] s,	[395] d
[312] dt	[354] ,E	[396] de

[397] evi

[398] ic

[399] ces.

Outline the message that was sent: