

## Solutions to ECE 154C Problem Set 7

1. **Solution:**

(a) Using the trellis diagram given for part (b), we can find the path with the minimum hamming weight 5.

(b) Refer to scanned pages.

(c) Refer to scanned pages.

2. **Solution:**

(a) Using the trellis diagram given for part (b), we can find the path with the minimum hamming weight 4.

(b) Refer to scanned pages.

(c) Refer to scanned pages.

3. **Solution:**

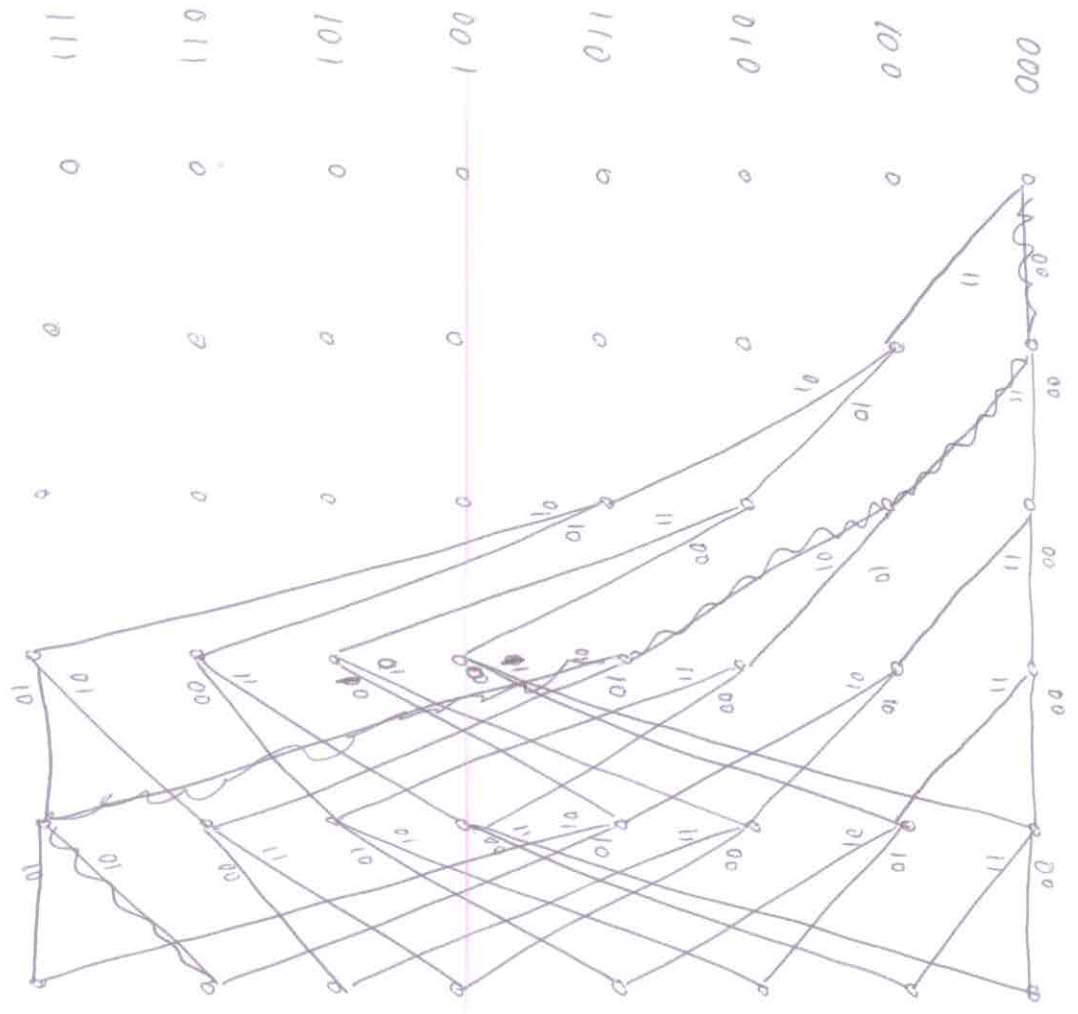
The (23, 12) Golay code can be extended by adding an overall parity check to each code word to form the (24, 12) extended Golay code. This code can be generated by the 12 by 24 matrix  $G = [I, A]$  where  $I$  is the 12 by 12 identity matrix and  $A$  is the following matrix:

$$A = \begin{bmatrix} 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \end{bmatrix}$$

The number of codewords per hamming weight is as the following.

Hamming Weight	Num of codewords
0	1
8	759
12	2576
16	759
24	1

1. (b)



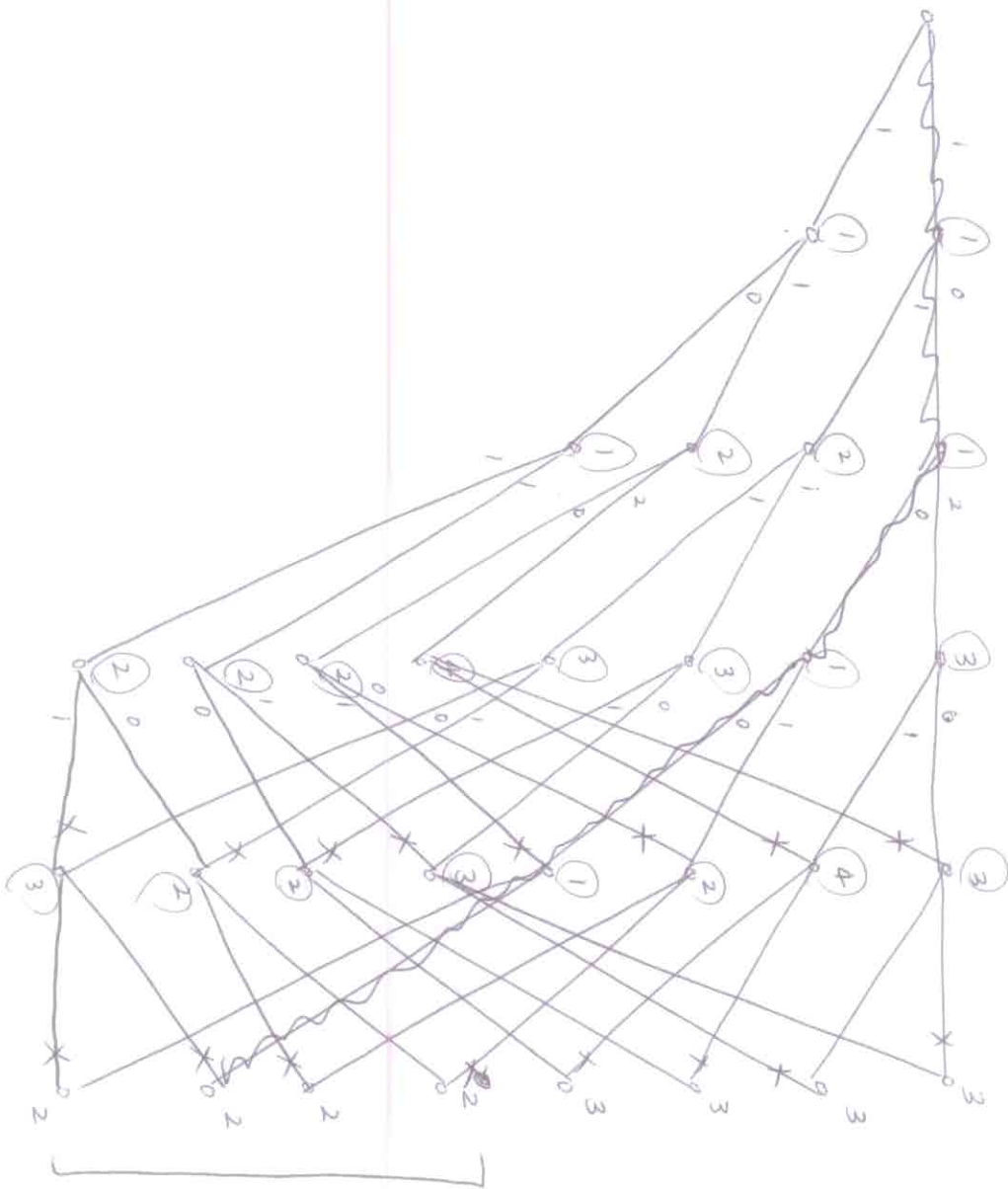
encoded to

00 11 01 01 01





2. (c)



Select one

decodes to

0 0 1 1 0