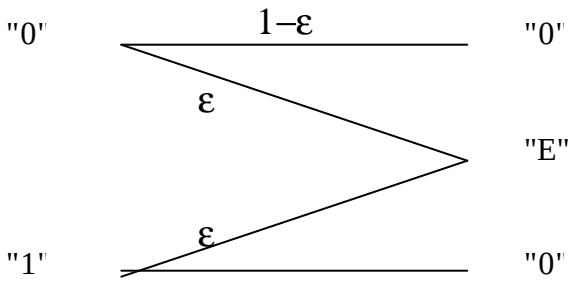
16.682 Homework Assignment
Due: April 19, 2001

Problem 1:

Find the capacity for the channel shown in figure 1. This channel is known as a binary erasure channel, where with probability ε, a transmitted bit is "erased" and the received cannot determine if it was a zero or a one.



Problem 2:

Generate the standard array for the following (6,3) code (in systematic form): {000000, 100101, 001011, 101110, 010111, 110010, 011100, 111001}. How would you decode the received sequence 111111?

Problem 3:

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

The generator matrix for a (6,3) code is given above.

A) find the minimum distance for the code
B) Find the parity check matrix for the code
C) What codeword would you use to encode 111?
D) Suppose you receive 111111, how would you decode it?

Problem 4 (CRC)

A) For the generator polynomial G=11101 give the shift register implementation of the CRC generator.
B) Use the above shift register implementation of G, with M=1101 to compute the CRC. Show the register content after each shift and the final CRC.
C) Suppose G=11101 and the received T=1111001001, did any errors occur?