

Hint for constructing an encoder:

What you want to do is add up the rows of the C matrix which correspond to 1's in your codeword. To do this, put m in a column next to your encoding matrix C. Now, you want to construct a new matrix next to C with just the rows of C where m is 1. To do this, you can multiply the entry of m in row i with the entry of C in (i,j) to get the (i,j) entry in the new matrix. You can do this by making just one entry and copying it. If you stick a \$ before a row or column number in a spreadsheet, it doesn't change when you copy it, so you put the formula =C2*\$A2 in a cell, then the C and 2 change when you copy the formula, but the \$A always refers to the first column. You then want to add up all the columns (mod 2) to get the entries in the vector mC. We illustrate the process below for a non-very-good code.

m		Encoding matrix C						Row i of C if $m_i=1$				
1		1	0	0	1	1		1	0	0	1	1
0		0	1	0	1	0		0	0	0	0	0
1		0	0	1	0	1		0	0	1	0	1
							mC	1	0	1	1	0

Hint for constructing the decoder: Again, you need to do matrix multiplication like you did to get mC. You already know how to do that. You also need to figure out which row of D is the same as rD, where r is your received codeword. The easiest way to do this (I think) is to construct an integer from the 0-1 vector r by considering r as an integer written in base 2. Do the same thing for each of your rows, and then use if statements to compare them.