COSC A493

CODING THEORY

SPRING 2006

PROGRAMMING ASSIGNMENT 1

Write a program to generate all the code words for the binary block (7, 8) parity-check code. You may use any language you wish. There need be no input to the program. The output should be as follows:

< your name >

(7, 8) parity check code

List of message words in B^7 List of code words in B^8

The program must **generate** the message words, and must **compute** the code words using a generator matrix.

Turn in the following items.

(1) A correct, documented program with your name printed on it.

(2) Output as specified above.

This assignment is due at the beginning of class on Wednesday, February 8.

MATRIX MULTIPLICATION

Assume two matrices exist, A and B, where A is $m \times n$ and B is $n \times c$. Then AB is $m \times c$. Write the two matrices as follows:

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix}$$

and

$$B = \begin{pmatrix} b_{11} & b_{12} & \cdots & b_{1c} \\ b_{21} & b_{22} & \cdots & b_{2c} \\ \vdots & \vdots & \cdots & \vdots \\ b_{n1} & b_{n2} & \cdots & b_{nc} \end{pmatrix}$$

Denote the product AB by P. Then

$p_{11} = a_{11} * b_{11} + a_{12} * b_{21} + a_{13}b_{31} + \cdots + a_{1n} * b_{n1}$

$p_{11} = \Sigma_{k=1}^{n} a_{1k} * b_{k1}$

In the general situation, if we want the value of p_{ij}, then on the left, and in each product on the right, we replace the leftmost 1 by i and the rightmost 1 by j. The result is

$p_{ij} = a_{i1} *$