## CMSC 442/653 Fall 2007 Instructor: Dr. Lomonaco Homework 4

- Listen to Igor Stravinsky's Firebird
- **Reading Assignment:** Review relevant slides on "Overview of Coding Theory" found at <u>http://www.cs.umbc.edu/~lomonaco/f06/653/Slides653.html</u>
- **Optional Reading assignment:** Peterson & Weldon, "Error-Correcting Codes," MIT Press, (Second Edition), Chapter 3, Pages 40-47.

1U) Let V be the linear code over GF(3) determined by the generator matrix

	(0)	2	1	2	0)	
<b>G</b> =	2	1	1	0	2	
	2	2	0	1	1)	

- a) Find a parity check matrix H for the linear code V.
- **b)** What is the length n of V.
- c) Put the generator matrix of V in echelon canonical form to find the dimension k of V.

**2U)** Let V be the binary linear code given by the generator matrix

	(1	0	1	0	1	1)	
<b>G</b> =	0	1	1	1	1	0	
	0	0	0	1	1	1)	

- a) Find a parity check matrix H of the binary linear code V.
- **b)** Use the generator matrix to create a list of all code vectors of V.
- c) Use the list generated in in b) to determine the minimum d distance of V
- **d)** Explain why it is easier to find the minimum distance for a linear code than it is for a non-linear code.

**3U)** Let V be the binary linear code given by the parity check matrix

	(1	0	1	1	1	1)	
<i>H</i> =	1	1	0	1	1	1	
	1	0	0	1	0	1)	

Find a generator matrix G for V.