

CMSC 442/653
Instructor: Dr. Lomonaco
Homework 3

- **Listening Assignment:** Listen to Gilbert & Sullivan's *Pirates of Penzance* (or see the movie.).
- **Reading Assignment:**
<http://www.cs.umbc.edu/~lomonaco/f06/653/handouts/Peterson-Pages22-25.pdf>

1) (25pts) Put the following matrix into reduced echelon canonical form over $GF(3)$

$$\begin{pmatrix} 0 & 0 & 2 & 2 & 0 & 2 \\ 2 & 2 & 0 & 2 & 1 & 2 \\ 1 & 1 & 2 & 0 & 2 & 2 \\ 1 & 1 & 0 & 1 & 2 & 1 \end{pmatrix}$$

Please show all your steps, and the reason for all your steps.

2) (25pts) Put the following matrix into reduced echelon canonical form over $GF(11)$

$$\begin{pmatrix} 0 & 0 & 2 & 2 & 0 & 2 \\ 2 & 2 & 6 & 8 & 4 & 8 \\ 1 & 1 & 5 & 6 & 2 & 5 \\ 1 & 1 & 3 & 4 & 2 & 7 \end{pmatrix}$$

Please show all your steps, and the reason for all your steps.

3) (25pts) Find the inverse of the following matrix over \mathbb{Z}_6

$$\begin{pmatrix} 1 & 2 & 1 \\ 3 & -2 & 4 \\ 0 & 1 & 0 \end{pmatrix}$$

4) (25pts) Find the inverse of the following matrix over $GF(7)$

$$\begin{pmatrix} 1 & 2 & 1 \\ 3 & -2 & 4 \\ 0 & 1 & 0 \end{pmatrix}$$