

CMSC 442/653
Instructor: Dr. Lomonaco
Homework 2

- **Listening Assignment:** Listen to Mozart's Eine Kleine Nachtmusik.
 - **Reading Assignment:**
<http://www.cs.umbc.edu/~lomonaco/f11/653/handouts/Permutations-Handout.pdf>
 - **Optional Reading assignment:** Peterson & Weldon, "Error-Correcting Codes," MIT Press, (Second Edition), Chapter 2.
- 1) (20pts) Let a and b be the permutations defined in the above handout on permutations.
- a) Using the 2×11 representation of permutations, compute the 2×11 representation of the permutation ba .
 - b) Using the product of disjoint cycles representation of permutations a and b , compute the product ba in the product of disjoint cycles form
 - c) Using the 2×11 representation of b , compute the 2×11 representation of the permutation b^{-1}
 - d) Using the product of disjoint cycles representation of the permutation b , compute the inverse b^{-1} in product of disjoint cycles representation form
- 2) (20pts) Construct the addition and multiplication tables for the ring
 $R = \mathbb{Z}_{15}$
List all the units in R . List all the non-trivial divisors of zero in R .
- 3) (20pts) Construct the addition and multiplication tables for the ring
 $R = GF(2)[x] \text{ mod } x^3 + 1 = 0$
List all the units in R . List all the non-trivial divisors of zero in R .
- 4) (20pts) Construct the addition and multiplication tables for the ring
 $R = GF(2)[x] \text{ mod } x^4 + 1 = 0$
List all the units in R . List all the non-trivial divisors of zero in R .
- 5) (20pts) Construct the addition and multiplication tables for the ring
 $R = GF(2)[x] \text{ mod } x^3 + x + 1 = 0$
List all the units in R . List all the non-trivial divisors of zero in R .