

# MAT 148, Winter 2016

## Homework Assignment 7

**Due before the start of the class on Friday, March 11**

Please read the sections 5.2-5.3 of the textbook before starting on the problem set.

**Written Assignment** (see p. 81-83):

2. Prove that  $\mathbb{Z}_2[x]/(x^3 - 1)$  is not a field by presenting an element with no multiplicative inverse.
- 9a. Write the generator polynomials and generator matrices for all binary cyclic codes of length 7.
11. Which length 7 binary cyclic codes contain the vector  $(0, 1, 0, 0, 1, 1, 1)$ ?
13. We know that modulo 2

$$x^{15} - 1 = (x + 1)(x^2 + x + 1)(x^4 + x + 1)(x^4 + x^3 + 1)(x^4 + x^3 + x^2 + x + 1).$$

How many binary cyclic codes of length 15 are there?

*The homework must be legible, and written in connected sentences that explains what you are doing. Just the answer (whether correct or not) is not enough. Please put your name and section number on every page and staple the pages together. Homework should be handed in on time, late homework will not be graded.*