

Math and Computers, Math 165
Homework five, Due November 20

1. Chapter 2 section 5 number 8,12
2. Chapter 2 section 6 number 3,6,8.
3. Is $G = \{x^4y^2 - z^5, x^3y^3 - 1, x^2y^4 - 2z\}$ a Gröbner basis for the ideal it generates in gradedlex order?
4. Use Buchberger's algorithm to compute a Gröbner basis for the following ideal I in lex order: $I = \langle x^2 + y, x^4 + 2x^2y + y^2 + 3 \rangle$
5. Compute a Gröbner basis for the ideal $I = \langle x^2 + y - 1, xy - x \rangle \subset Q[x, y]$ with respect to lexicographic order using Buchberger's algorithm. If your basis is not minimal compute a minimal one.

Which of the following polynomials belongs to the ideal I ? $f_1 = x^2 + y^2 - y$,
 $f_2 = 3xy^2 - 4xy + x + 1$.