

## Worksheet 7/17. Math 110, Summer 2012

An asterisk \* denotes a harder problem. Speak to your neighbours, these problems should be discussed.

### Algebra of polynomials

1. Use the division algorithm to find  $g, h$ , with  $\deg h < \deg f_2$  and such that  $f_1 = gf_2 + h$ :

a)  $f_1 = t^4 + 2, f_2 = t^3 + 5t^2 - 1,$

b)  $f_1 = 3t^{13} - 6t^5 + 3t, f_2 = t^3 + t^2 + t + 1,,$

c)  $f_1 = -7t^2 + 5t + 2, f_2 = 4t^2 + 4t.$

2. Perform the Euclidean algorithm on the polynomials in Question 1 to determine the 'greatest common divisor' of  $f_1, f_2$ : ie, find  $u, v \in \mathbb{C}[t]$  such that

$$uf_1 + vf_2 = \gcd(f_1, f_2).$$

Which of the pairs of polynomials in 1 are relatively prime?

(Hint: if you get stuck then consider the corresponding algorithms for integers and try to transfer the method to the polynomial setting.)