

## Answer on Question #44362 - Math, Abstract Algebra

### Problem

Express  $f$  as  $gq+r$  in the following cases:

i)  $f = x^4+x+1$ ,  $g = x^2+1$  in  $\mathbb{Q}[x]$ .

ii)  $f = 5x^3+2x^2+3x+1$ ,  $g = x+2$  in  $\mathbb{Z}_7[x]$ .

### Solution

i)  $x^4 + x + 1 = x^4 - 1 + x + 2 = (x^2 + 1)(x^2 - 1) + (x + 2)$ ;

ii)  $5x^3 + 2x^2 + 3x + 1 \equiv (x + 2)(5x^2 + 6x + 5) + 5$  in  $\mathbb{Z}_7[x]$ .