

Math 521A: Abstract Algebra I

Homework Supplement

Problem 1: Multiply over the quaternions:

$$(x^2 + \mathbf{j}x + \mathbf{k})(x^2 + \mathbf{i}x + \mathbf{j})$$

Problem 2: Using an example, show that the quotient remainder theorem does *not* hold in $\mathbb{Z}_6[x]$.

Problem 3: You might want to look up Pascal's triangle and the binomial theorem before doing this one.

- Compute $(x + 1)^2$ in $\mathbb{Z}_2[x]$.
- Compute $(x + 1)^3$ in $\mathbb{Z}_3[x]$.
- Compute $(x + 1)^4$ in $\mathbb{Z}_4[x]$.
- Compute $(x + 1)^5$ in $\mathbb{Z}_5[x]$.

Any ideas? Try experimenting with Sage.