

(c) Conclude that $\mathbb{F}_p D_8 \cong (\oplus_{i=1}^4 \mathbb{F}_p) \oplus M_2(\mathbb{F}_p)$. (where $p \neq 2$).

Q8 We showed in class that either

$$\mathbb{F}_3 D_{10} \cong \mathbb{F}_3 \oplus \mathbb{F}_3 \oplus M_2(\mathbb{F}_3) \oplus M_2(\mathbb{F}_3)$$

or

$$\mathbb{F}_3 D_{10} \cong \mathbb{F}_3 \oplus \mathbb{F}_3 \oplus M_2(\mathbb{F}_{3^2})$$

Use Lagrange's theorem to determine which one of the two isomorphisms above applies.

Q9 Using the presentation of \mathbb{H} given in Q7, show that $\langle \hat{a} \rangle$ is a central idempotent of $\mathbb{F}_3 \mathbb{H}$. List all the elements of $\text{Ann}_r \Delta(\mathbb{H}, \langle \hat{a} \rangle)$ in the group ring $\mathbb{F}_3 \mathbb{H}$.

Q10 Find $|GL_3(\mathbb{F}_{p^n})|$.

Solutions