

Algebra 2 (2014)-Aalborg Universitet

Spiseseddel 16

16. gang (B), mandag 14. 7. april, 8:15-12:00 i lokale G5-112

- 8:15-10:00 Forelæsning: Eksistens og entydighed af endelige legemer (sider 170–173).
- 10:00-12:00 Opgaveregning og beviser:

Beviser: Lemma 4.8.1, Theorem 4.8.5, Section 4.8.2, Proposition 4.6.7, Proposition 4.4.3.

Opgaveregning [Lau], 4.10 (side 179): A, B, C, D, 7, 27, 28, 29, 30, 32

Opgave A: Let $f \in F[X]$ be a reducible polynomial. Show that $F[X]/\langle f \rangle$ is not a field (hint: one can easily show that it is not a domain). For instance, find a zero divisor in $\mathbb{F}_2[X]/\langle X^2 + 1 \rangle$.

Opgave B: Find an irreducible polynomial $f \in \mathbb{F}_2[X]$ with degree 4. Construct $\mathbb{F}_{16} = \mathbb{F}_2[X]/\langle f \rangle$. Write the addition and multiplication table of $\mathbb{F}_{16}$ (you do not have to write the complete table, a few rows is enough). Find a generator of the cyclic group $\mathbb{F}_{16}^*$.

Opgave C: Find an irreducible polynomial $f \in \mathbb{F}_4[X]$ with degree 2. Construct $\mathbb{F}_{16} = \mathbb{F}_4[X]/\langle f \rangle$. Write the addition and multiplication table of $\mathbb{F}_{16}$ (you do not have to write the complete table, a few rows is enough). Find a generator of the cyclic group $\mathbb{F}_{16}^*$.

Opgave D: Prove that the fields constructed in exercises B and C are isomorphic.

Med venlig hilsen,

Diego