

Examination questions

Mathematical Cryptology MAT-63256

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Instructions:

Use of books, notes, dictionaries, ebooks, calculators and computers allowed.

Questions:

1. Is there a finite field having more than 132 elements in which $1+1+1+1+1=0$?
2. In the multiplicative group of a seven-element field (of integers modulo 7), find the order of each element.
3. Find the discrete logarithm base 21 of 16 in the multiplicative group of the 23-element field (of integers modulo 23).
4. Determine all quadratic residues modulo 13.
5. What is the number of quartic (degree 4) polynomials over an 11-element field ?
(An exact formula giving that number is sufficient as an answer.)