

General instructions

**Use of books and notes is allowed.**

Provide concise answers with short and precise justification.

Write your family name on every page you hand in,

number consecutively all pages that you hand in,

write on the first page the number of pages that you hand in.

No page should contain answers or fragments of answers to more than one question.

**Please write your answers with pen or dark pencil.**

Questions:

1. Is it true that if the number of elements of a finite non-commutative group is odd, then the group has at least 9 elements?
2. How many normal subgroups does the quotient group  $\mathbf{Z}/9\mathbf{Z}$  have?
3. Over a 2-element field, what is the number of polynomials of degree 4?
4. Is it true that every additive subgroup of every subring of the ring  $\mathbf{Z}$  of integers is necessarily an ideal of the subring?
5. Given two 4-element cyclic groups  $G$  and  $H$ , what is the number of isomorphisms from  $G$  to  $H$ ?