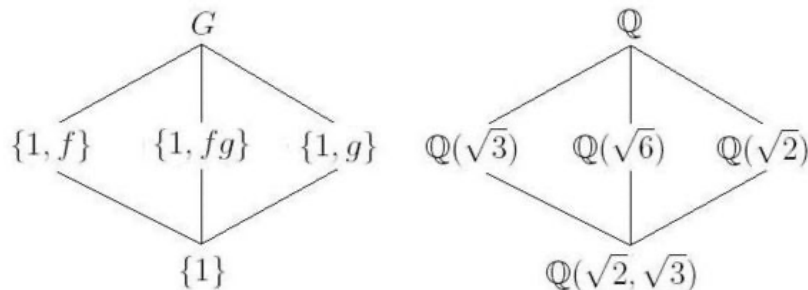




Claremont McKenna College, Spring 2025
MATH 172: Abstract Algebra II



Instructor: Lenny Fukshansky, Adams Hall 218, (909) 607 - 0014, lenny@cmc.edu
Time: Tuesdays and Thursdays, 2:45 – 4:00 pm

Prerequisites: MATH 171.

Text: Abstract Algebra (3rd edition), by David S. Dummit and Richard M. Foote (published by John Wiley & Sons, Inc.)

Course Description: We all know how to solve quadratic equations – there is a simple formula for the roots. But have you ever wondered if there exist such formulas for polynomial equations of higher degree? Well, it turns out that there are known (albeit complicated) formulas for the roots of polynomials of degrees three and four which use cubic and fourth degree roots, but amazingly enough no general formula in radicals is possible for the roots of polynomials of degree five and higher! This surprising result is known as *Abel-Ruffini Theorem* (due to the first incomplete proof by Paolo Ruffini in 1799, completed by Cauchy in 1813) or *Abel's Impossibility Theorem* (proved independently by Niels Henrik Abel in 1824). Although obtained later, its most commonly cited proof follows from the deep and influential theory of Evariste Galois, a legendary French mathematician who died at the young age of 21, leaving a priceless legacy, which developed into one of the most central areas of modern mathematics.

This course is a continuation of MATH 171, covering selected topics in the theories of groups, rings, fields, and modules with a specific emphasis on Galois Theory. Topics covered will include polynomial rings, field extensions, splitting fields, algebraic closure, separability, Fundamental Theorem of Galois Theory, Galois groups of polynomials, and solvability.

Abstract Algebra is in the core of modern mathematics, and its knowledge is crucial for any serious mathematics student.

Grading: Based on regular homework assignments, a midterm, and a final.

Registration is open to students from all of the Claremont Colleges, and I am happy to talk to anyone interested in this course!