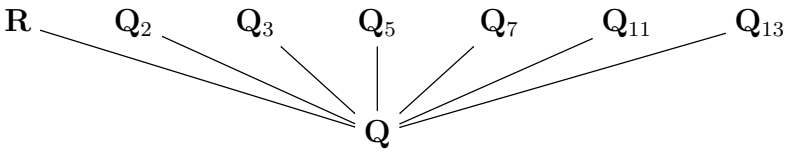
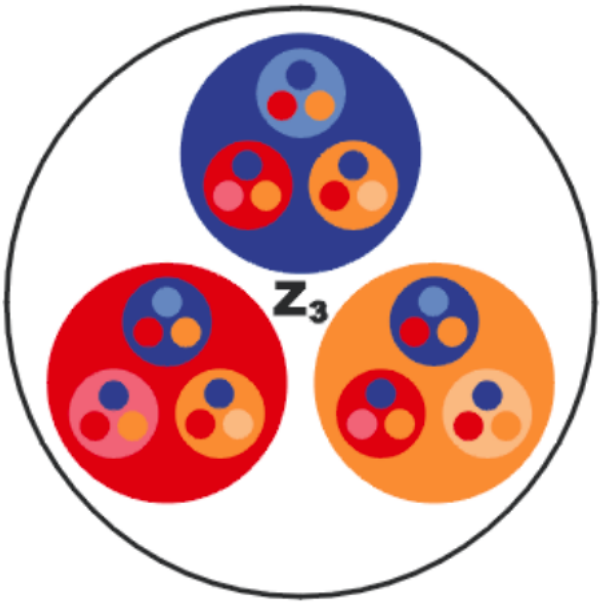
MATH 3094: p-ADIC NUMBERS (FALL 2016)

The real numbers are the workhorse number system used throughout undergraduate math classes: in calculus, differential equations, linear algebra, analysis, and (differential) geometry. Near the end of the 19th century mathematicians discovered infinitely many other number systems where algebra (addition, multiplication, etc.) and calculus (limits, derivatives, integrals, series) fit together harmoniously. Each new number system is associated to a different prime number p, and is called the p-adic numbers.

Calculus in the p-adic numbers, called p-adic analysis, is now a standard tool in several areas of math, and while it gets inspiration from more classical parts of analysis and geometry (there are p-adic power series, p-adic differential equations, and p-adic manifolds) it has its own features that are unlike anything in ordinary calculus (e.g., the integers are a bounded nondiscrete set in the p-adic numbers, an infinite series of p-adic numbers converges if and only if its general term tends to 0, and the p-adic exponential function preserves distances).

In this course we will explore the p-adic numbers and some of their applications to classical problems.





Prerequisites: An algebra course (Math 3230 or 3240) with some willingness to learn a little analysis, or an analysis course (Math 2141 or 3150) with some willingness to learn a little modular arithmetic. Enrollment requires instructor permission.

Questions? Email the instructor, Keith Conrad, at `kconrad@math.uconn.edu`.