Senior Project Presentation

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Title: Quandle coloring of knots

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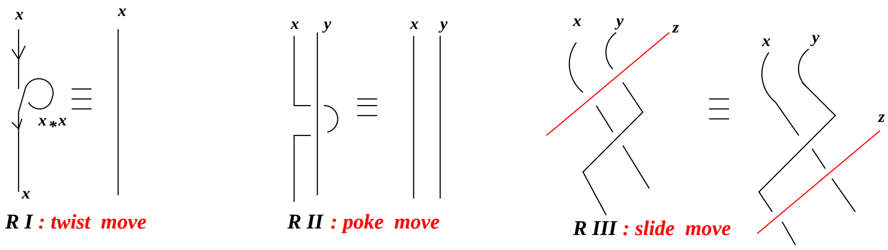
A **quandle** is an algebraic concept derived from **Reidmeister moves** in Knot Theory. A **quandle** is defined as a set Q paired with a binary operation $\star$ satisfying three axioms: For all $x, y, z \in$ Q:
(1) $x \star x = x$.
(2) There exists a unique $z \in$ Q $: z \star y = x$, and
(3)$(x \star y) \star z = (x \star z) \star (y \star z)$.

Quandle theory is a relatively new subject in abstract algebra which has applications to various areas of topology. Readers who are familiar with abstract algebra should think of quandle theory as analogous to group theory. In fact, a form of quandle now called an "involutory quandle" was described in Japan (called "kei") as far back as 1942!. Variants on the quandle idea have been studied by Conway (wracks), Brieskorn (automorphic sets), Matveev (distributive groupoids), Kauffman (crystals), Fenn and Rourke (racks), though the current terminology is due to **David Joyce**, who coined the word "quandle" in his 1980 doctoral dissertation. In this talk, I will give examples of important quandles and discuss three facts:

(1) How quandles are derived from Knot theory via Reidmeister moves.

(2) How Fox coloring of knots was generalized to **quandle coloring**, and

(3) Every tame knot in three dimensional euclidean space has a **fundamental quandle**, which is a complete invariant of knots.



Reidmeister moves