

**Undergraduate Math Club
Winter 2007
2nd floor Nesbitt Common Room
Thursday, April 5, 4:10-5:00pm
(free pizza and pop, as always)**

Return of the Quaternions

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Abstract

The *quaternions* are a 4-dimensional system of “hypercomplex” numbers that do not obey the rule

$$x \cdot y = y \cdot x.$$

Because of this, in the 19th century they were controversial and much of mathematics was divided between pro- and anti-quaternion forces. Ultimately quaternionists lost, which is why parts of modern linear algebra are taught with matrices and not quaternions.

We’ll return to the quaternions and present some of their interesting and counterintuitive properties. In particular, we’ll use them to construct the *Hopf fibration*, a collection of circles (and one line) that completely fill 3-dimensional space in such a way that any two circles are linked.