
AMAURY DE BURGOS, University of Calgary

The length of cyclic algebras

Cyclic algebras, introduced by Leonard Eugene Dickson in 1906, were one of the earliest examples of non-commutative division algebras over a field. A notable numerical invariant of any algebra over a field is its length, defined as the length of its longest chain of linear subspaces. In 2016, the length of 4-dimensional cyclic algebras was proven to be 2 (Guterman & Kudryavtsev). More recently, in 2021, the length of cyclic algebras of dimension 9, 16, and 25 was stated to be 4, 6, and 8 respectively (Miguel). Through the use of two counterexamples, we show these latter values are ill-derived, meaning the length of cyclic algebras of dimension greater than 4 is still an open problem. In pursuit of solving this open problem, we construct an infinite family of cyclic division algebras and give a lower bound on the length of its members.