ISOMORPHISMS OF LEAVITT PATH ALGEBRAS PRESERVING THEIR SUBSTRUCTURES.

ABSTRACT FOR THE GENERAL PUBLIC

One of the fundamental concept in algebra is the concept of homomorphism of the considered structures. In this context, special attention is always paid to isomorphisms.

In this project, we want to consider, the (associative) Leavitt path algebras $L_R(E)$ over commutative rings, an object that draws from two areas: algebra and graph theory. The area of interest in the latter field are graphs, i.e. certain relational systems, which can additionally be presented in a graphic form as a set of points and connections between them. To construct them, a commutative ring R and a directed graph E are needed as a starting points.

A large part of the results concerning this class of algebras is based on the expression of the algebraic properties of the studied objects in the language of properties of the graph E. Thanks to this procedure, properties that are often difficult to describe in an accessible way can be presented in a more vivid, graphic manner.

In order to express in a popular science way this part of the project and at the same time embed it in what we presented above, we can present the following question:

Suppose that the Leavitt path algebras LR(E) and LR(F) are isomorphic. What kind of relations hold between underlying graphs E and F?

The presented question, its generalizations to more general algebraic structures and special cases derived from additional assumptions imposed on the isomorphism, are the axis of our research plans related to Leavitt path algebras. It should be added that the research will include considerations on maximum commutative subalgebras of the structures we are interested in, in particular their classification and their generalizations. It is known from the literature that this class of subalgebras is closely related to the isomorphism of the Leavitt path algebras.