

REVIEW BY THE OPPONENT OF THE BACHELOR THESIS

Thesis title: Homological dimensions and special classes of rings
Thesis author: Emil Čuřín

SUMMARY OF THE THESIS CONTENT

The thesis deals with some foundational aspects and results in basic homological algebra of commutative noetherian rings. Specifically, the author delves into the projective dimension, injective dimension, and G-dimension of modules over commutative Noetherian local rings. The study includes elucidating non-trivial properties and characterizations of significant ring types such as regular local rings and Gorenstein rings via these homological dimensions.

OVERALL EVALUATION OF THE THESIS

Thesis topic. The topic of the thesis is appropriate for a Bachelor's level and, by some standards, may even exceed it.

Author's contribution. The author presents detailed explanations of some results that are often hard to track in literature. Additionally, the author provides a proof using injective dimension to address the non-trivial direction of the Auslander-Buchsbaum-Serre criteria. This criterion asserts that if there exists a uniform upper bound for the projective dimension of modules over a commutative Noetherian local ring, then the Krull dimension of the ring coincides with the vector space dimension of the cotangent space. Despite the classical nature of this topic, the proof presented by the author, which effectively intertwines projective and injective dimensions, may represent a fresh contribution to the reviewer's knowledge.

Mathematical level. The thesis is written to the correct standard of rigor, with appropriate hypotheses consistently presented and recalled in each chapter.

Work with sources. All source materials and references are properly cited and attributed whenever the author draws upon such content.

COMMENTS AND QUESTIONS

The well-written thesis demonstrates the author's mastery of the subject matter presented. I hope that this classical and highly important topic has sparked the author's interest in this field and will inspire them to delve deeper into the extensive literature that lies ahead.

CONCLUSION

I consider the thesis to be very good and I recommend that it be accepted as a bachelor's thesis.

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