REVIEW BY THE SUPERVISOR OF THE BACHELOR THESIS	
Thesis title:	Homological dimensions and special classes of rings
Thesis author:	Emil Čuřín

SUMMARY OF THE THESIS CONTENT

This thesis discusses Serre's characterization of regular local rings as those noetherian local rings having finite global dimension. This is a very famous result that initiated the use of homological techniques in commutative algebra. The thesis then go further, and proves an analogue result, due to Auslander, which characterizes Gorenstein rings as those local rings which have finite Gorenstein dimension.

In doing so, the author introduces the basics of graduate level homological algebra, and then goes on and discusses the basics of Gorenstein homological algebra, a rapidly developing relatively new area of research in homological algebra, where one replaces the projective modules by the more general (and much less understood) Gorenstein projective modules.

OVERALL EVALUATION OF THE THESIS

Thesis topic. The thesis discusses a very important foundational topic in the intersection of commutative algebra, algebraic geometry and homological algebra. This is a difficult subject, which far exceeds the undergraduate curriculum.

Author's contribution. Emil wrote several original proofs of known results, suggested an approach to the second chapter by focusing on injective dimension instead of projective dimension, and also completed many details that were missing from the account he followed concerning Gorenstein homological algebra.

Mathematical level. The level of the thesis is very high, everything is proved rigorously, and appears to be correct.

Work with sources. The author cites the sources he uses in constructing the proofs, and does not copy anything from these sources.

Formal editing. The thesis is nicely written, in the usual style of mathematical texts.

CONCLUSION

I consider the thesis to be excellent and I recommend that it be accepted as a bachelor's thesis with a grade of 1.

Liran Shaul
Department of Algebra
May 15, 2024