Opponent's report on the bachelor thesis

Title: Rank Two Commutative Semifields
Author: Ondřej Tittl

Content of the thesis

The thesis is divided into two chapters. The first chapter covers definitions of a pre-semifield and a semifield, right, left, midle and weak nuclei, and the isotopy relation of semifields. Some basic properties of these notions are studied. The second chapter deals with semifields of characteristic (at most) 2 over their middle nuclei, both in commutative and non-commutative case.

Evaluation of the thesis

Topic of the thesis. The topic is suitable for a bachelor thesis.

Students contribution. The thesis is a compilation of several sources. The student refined some proofs and examples.

Mathematics. Compared to the first version, the mathematical quality of the thesis improved. The first chapter is acceptable without further changes. Some parts of the second chapter could still be improved but there are no essential failings.

Citations. Sources are well cited.

Remarks and questions

Page 13 The student claims: Because multiplication by t is a linear transformation of the vector space S, as we have shown in Lemma 3, we can rewrite $t*(t*x) = t*L_1(x)+L_2(x) \quad \forall x \in \mathbb{F}_q$, where L_1, $L_2 \colon \mathbb{F}_q \to \mathbb{F}_q$ are $\mathbb{F}_p$-linear mappings. – *Could he explain in detail how this follow from Lemma 3?*

Subsection 2.2.2 *Can the student explain how he applied Lemma 11? In particular, how did the student make use of the fact that m is not a square in $\mathbb{F}_q$?*

Definition 6 *The definition of a* central weak nucleus *does not seem to match Ganley's definition. Can it be corrected?*

Conclusion

Compared to the first version, the quality of the thesis remarkably improved. The first chapter is acceptable without further changes. There are few arguments in the final chapter that could be refined but nothing that would disqualify the manuscript to be accepted as a bachelor thesis.

I recommend the thesis to be accepted.

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