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Seminar on Matrix Groups in the HWS 2020

The seminar will be held in english. It will follow the book

[C84] Morton L. Curtis, Matrix Groups, second edition, Springer 1984

The theory of matrix groups is a beautiful branch of mathematics. It has important applications to geometry, algebra and topology.

The book above is ideal for a seminar. The material can be taken for seminar talks as it is. The book introduces important concepts in matrix groups. There are notions, theorems and exercises.

The seminar will take place

as a block seminar by Zoom sessions,

probably on some Saturdays: 24.10., 07.11,

The number of days needed will depend on the number of talks.

There will be up to 13 talks (but it could be less).

The seminar aims at students in the bachelor or Master *Mathematics in Business and Economics* and in the bachelor or Master *Education Mathematics*.

If you are interested in a talk, please contact Dr. Mase,
mmase@mail.uni-mannheim.de,
until the end of the first teaching week in the HWS 2020, so until 02.10.2020.

The seminar has several aims.

(1) One is that the participants give a good talk and during preparation learn, how to achieve this. This means that one has to digest the material well, to choose well what to tell in detail and what not, and how to tell it. The talks shall take 90 minutes. Longer is forbidden absolutely, but much shorter is also bad. There is definitely for each talk enough material to fill 90 minutes (if the material in the main part should not be enough, one could add material from some exercises).

(2) All participants shall learn from all talks (not only their own one). It is good to prepare also for the other talks, by reading the relevant chapter. Doing that one could note some good questions which one can then pose during the talk if they are not answered anyway in the talk. The second aim requires presence at all talks.

(3) The book presents the material in a way, which is almost ready for seminar talks. The seminar shall cover (almost) all material in the book.

Talk 1:

General Linear Groups. Chapter 1.

Talk 2:

Orthogonal Groups. Chapter 2.

Talk 3:

Homomorphisms. Chapter 3.

Talk 4:

Exponential and Logarithm. Chapter 4.

Talk 5:

$SO(3)$ and $Sp(1)$. Chapter 5.

Talk 6:

Topology. Chapter 6.

Talk 7:

Maximal Tori. Chapter 7.

Talk 8:

Covering by Maximal Tori. Chapter 8.

Talk 9:

Conjugacy of Maximal Tori. Chapter 9.

Talk 10:

$Spin(k)$. Chapter 10.

Talk 11:

Normalizers, Weyl Groups. Chapter 11.

Talk 12:

Lie Groups. Chapter 12.

Talk 13:

Reflections, Roots. Chapter 13.