



KTH Teknikvetenskap

SF2723 Topics in Mathematics - Matrix groups
Homework Assignment 5
2008-10-01

The solutions should be handed in no later than October 8, 2008. The final grade will be based upon the total score on the homework and on the oral exam. The total maximal score on the homework assignments is 200 and in order to pass, at least 100 is required.

In order to get full score on each problem, the written presentation of the solution should be clear and the arguments easy to follow.

1. Compute the derivative of the exponential map

$$\exp : M_2(\mathbb{C}) \longrightarrow \mathrm{Gl}_2(\mathbb{C})$$

(Observe that Example 2-4.15 does not make sense, as you will see when computing the derivative above.) (7)

2. Determine the the dimension and a basis of the tangent space $\mathfrak{g}_S(\mathbb{R})$ of the Lorentz group defined by the matrix $S = \begin{pmatrix} I_{n-1} & 0 \\ 0 & -1 \end{pmatrix}$. (7)