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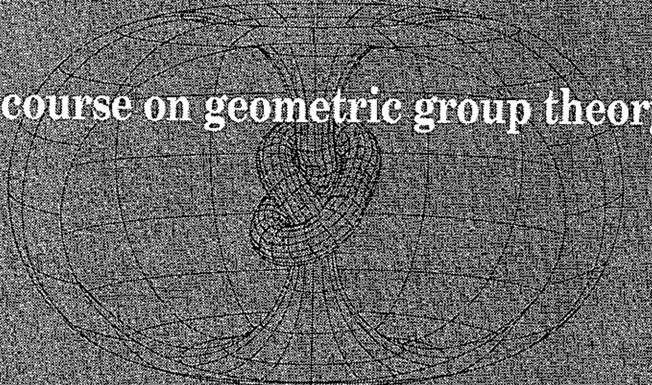

A course on geometric group theory

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Preface.

These notes are based on a series of lectures I gave at the Tokyo Institute of Technology from April to July 2005. They constituted a course entitled "An introduction to geometric group theory" totalling about 20 hours. The audience consisted of fourth year students, graduate students as well as several staff members. I therefore tried to present a logically coherent introduction to the subject, tailored to the background of the students, as well as including a number of diversions into more sophisticated applications of these ideas. There are many statements left as exercises. I believe that those essential to the logical development will be fairly routine. Those related to examples or diversions may be more challenging.

The notes assume a basic knowledge of group theory, and metric and topological spaces. We describe some of the fundamental notions of geometric group theory, such as quasi-isometries, and aim for a basic overview of hyperbolic groups. We describe group presentations from first principles. We give an outline description of fundamental groups and covering spaces, sufficient to allow us to illustrate various results with more explicit examples. We also give a crash course on hyperbolic geometry. Again the presentation is rather informal, and aimed at providing a source of examples of hyperbolic groups. This is not logically essential to most of what follows. In principle, the basic theory of hyperbolic groups can be developed with no reference to hyperbolic geometry, but interesting examples would be rather sparse.

In order not to interupt the exposition, I have not given references in the main text. We give sources and background material as notes in the final section.

I am very grateful for the generous support offered by the Tokyo Insititute of Technology, which allowed me to complete these notes, as well as giving me the freedom to pursue my own research interests. I am indebted to Sadayoshi Kojima for his invitation to spend six months there, and for many interesting conversations. I thank Toshiko Higashi for her constant help in making my stay a very comfortable and enjoyable one. My then PhD student Ken Shackleton accompanied me on my visit, and provided some tutorial assistance. Shigeru Mizushima and Hiroshi Ooyama helped with some matters of translation etc.

Contents.