LaTeX facilities, II

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Abstract

This short document is intended to show those students needing to use LaTeX a simple example of how to include citations using using BibTeX. Extensive information about using BibTeX can be found at www.bibtex.org. The inclusion of a table of contents is also illustrated. The original LaTeX file and the .bib file are also available. Note that the .bib file contains more entries than shown here. Only the cited references are extracted and shown in the final document.

Contents

1 Graphs and digraphs

A number of definitions on graphs and digraphs will be given as they are required. However, several standard graph theoretic terms will be used but not defined in these chapters; these can be found in any of the references [22] or [24].

1.1 An example of a subsection

A very short subsection!

2 Groups

Counting nonisomorphic graphs involves consideration of group symmetries. For more on this the reader is referred to [12].

2.1 And here is another subsection

The following theorem of Whitney [23] says that these are essentially the only cases when edge-isomorphisms that are not induced by isomorphisms can arise. We give the statement of the theorem without proof, which, although not deep or difficult, would lengthen this introductory chapter without adding significant new insights.

2.2 And another

Of course, there are several terms in the previous sentence that need exact definitions, but we shall here take an intuitive approach and refer the reader to [4] or [8] for the exact details on computational complexity.

3 The next section

An important computer algebra package, which is also freely available, is the system GAP [21]. This package performs very sophisticated routines in discrete abstract algebra, in particular routines on permutation groups. It incorporates a number of extensions, one of which, GRAPE [20], deals specifically with graphs, including their automorphisms and isomorphisms.

3.1 More references

Finally, it should be mentioned that it is generally accepted that the best package to tackle graph isomorphisms is *nauty* [18], developed by Brendan McKay. In fact, the system GRAPE invokes *nauty* when computing automorphisms or isomorphisms.

4 Notes and guide to references

One of the standard texts on graph theory has, for many years, been [11]. More recent books that give an excellent coverage of the subject are [3, 6, 22, 24]. The last reference is a short introduction that is quite sufficient background for this book. Biggs' book [2] is the standard text on algebraic graph theory, but the more recent [9] is also an excellent and up-to-date textbook on the subject. The book [10] contains a number of recent and specialised survey papers on various aspects of algebraic graph theory, particularly those dealing with graph symmetries. A proof of Whitney's Theorem can be found in [1].

We shall only be needing the most elementary notions of group theory. The text [16] gives ample coverage for our purposes, while [19] provides a more complete treatment. Two excellent books devoted entirely to permutation groups are [5, 7]. Most of the results and definitions on permutation groups that we have given here and others that we shall be needing can be found in the first few chapters of these two books.

For a full discussion of the terms on computational complexity that were introduced above rather intuitively, the reader is referred to the standard textbook [8] or the more recent [4]. The book [14] and the references that it cites are suggested for those who are interested in the computational complexity of the graph isomorphism problem. Those who are particularly interested in some of the powerful algebraic techniques used to tackle this problem should look at the papers [13, 17]. For practical computations on a computer with permutation groups and graph automorphisms and isomorphisms in particular, the system [15], mentioned above, or the systems [18, 20, 21] are recommended.

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