Home assignment 3

Starting with $n = 3$ and for each $n \geq 3$ as far as you can go, find for each $3 \leq k \leq n$ the number of nonisomorphic connected simple loopless undirected graphs on n vertices with exactly one cycle, which must be of length k.

In evaluating the reports the efficiency of the method is of high importance, but excessive use of computational resources is not necessary. Approximately 2 hours of CPU time on a PC is a sufficient order of magnitude. Evaluate the efficiency of your solution.

Hints

In solving the problem, computing the canonical form of a graph might prove useful.

`nauty`[1] by Brendan McKay is a subroutine library written in C for computing the canonical form or automorphism group of a graph.[2]

Due date

Return the assignment according to the instructions on the course page to Aleksi Hänninen (ahannin©tcs.hut.fi) no later than on Wednesday April 25.

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[1] `http://cs.anu.edu.au/~bdm/nauty/`

[2] If the programming interface to `nauty` is too difficult for your tastes, you might use the interactive `dreadnaut` included in the `nauty` package. Or you might program routines for finding the canonical form of a graph yourself, but this can be tricky to get right.