Algorithmische Graphentheorie I (WS 2017/2018)
Tutorial 6 - November 24, 2017

Aufgabe 1
Let $G$ be a graph. The line graph of $G$, denoted by $L(G)$, consists of vertex set $E(G)$ and edge set
\[ \{[e_1, e_2] : e_1, e_2 \in E(G), e_1 \cap e_2 \neq \emptyset\}. \]

Compute the line graphs of the following graphs! Are there graphs whose line graphs are isomorphic to one of the following?

(a) $P_n, C_n, K_n, K_{1,n}, n \geq 3$.

(b)

(c)

Aufgabe 2
Let $Q$ be a $3 \times 3$ cheese cube consisting of 27 small $1 \times 1 \times 1$ cubes. Can a mouse eat all 27 small cubes of $Q$ by starting in a corner cube, ending in the middle cube, and moving only between cubes of $Q$ sharing a face?

Aufgabe 3
Compute all simple, non-isomorphic graphs $G$ with $\omega'(G) = 3, \pi(G) = 12, m(G) = 10$ whose components are $G_1, G_2, G_3$, and

(i) $G_1$ and $G_2$ are non-isomorphic,

(ii) $L(G_1)$ is isomorphic to $L(G_2)$, and

(iii) $G_3$ is a tree with exactly three leafs.

Aufgabe 4
Are there graphs which are 1-tough but non-hamiltonian?