Algebraische Strukturen: Diskrete Strukturen
Kombinatorik

Exercise sheet 4

6 Points each exercise.

Problem 1
Prove that every finite graph with at least two vertices contains two vertices of the same degree.

Problem 2
Prove that any infinite directed graph contains an infinite set that induces one of the following:

- a clique,
- a clique where additionally all vertices have loops,
- an independent set,
- loops at each vertex and otherwise no edges,
- a strict linear order,
- a weak linear order.

Problem 3
Prove that for every $c \in \mathbb{N}$ and every finite partially ordered set $(M, \leq)$ there exists a partially ordered set $(L, \leq)$ such that for every colouring $\chi: L \to [c]$ there exists a monochromatic subposet of $(L, \leq)$ which is isomorphic to $(M, \leq)$.

Abzugeben am Freitag, den 11.1.2019 vor der Vorlesung.
Es können Zweiergruppen gebildet werden.