University of Konstanz
Algorithmics
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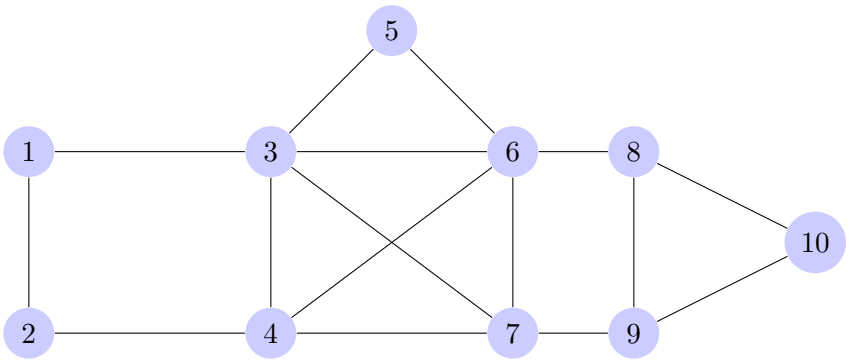
Network Analysis
Summer 2014

Assignment 9

Issue date: 19 June 2014 **Due date:** 26 June 2014, 11:00
It is explicitly recommended to solve exercises in groups of two.

Exercise 1: Structural Equivalence — 4 Points

Consider the *Maximum Structural Equivalence* – **MSE** introduced in the class. Run the algorithm on the following graph. State the output of each step of the execution of the algorithm for the given graph.



Exercise 2: Regular Equivalence — 2+2+2

Let in the following P and Q be partitions of V and $S, S_1, S_2 \subseteq V$.
Show, that

(a) $Q \preceq P \;\Rightarrow\; \text{split}(S, Q) \preceq \text{split}(S, P)$

(b) $\text{split}(S, \text{split}(S, Q)) = \text{split}(S, Q)$

(c) $\text{split}(S_2, \text{split}(S_1, P)) = \text{split}(S_1, \text{split}(S_2, P))$

[please turn over]

Exercise 3: Coarsest Relational Partition **5**

Consider the *Coarsest Relational Partition* – **CRP** algorithm from the lecture. In the lecture, the correctness of the following invariant from the algorithm was proven.

The algorithm maintains the invariant that Q is stable w.r.t. all blocks of R.

Prove the correctness of:

The final R returned by the algorithm is the coarsest relational partition of the given partition P.

Please submit your answers electronically to teaching assistant Habiba (habiba@uni-konstanz.de).