Assignment 6

Issue date: 29 May 2014   **Due date:** 05 June 2014, 11:00
It is explicitly recommended to solve exercises in groups of two.

Exercise 1: Shortest Path Distances   **4+3 Points**

(a) Proof the correctness of the *Floyd-Warshall* algorithm for shortest-path distances (Algorithm 8 in the lecture notes).

(b) Construct an example graph $G = (V, E)$ that shows that the number of shortest paths between a pair of vertices can be exponential in the number of vertices $|V|$.

Exercise 2: Reachability   **3+1+3 Points**

(a) For what kind of graphs are the following statements concerning the reachability relation fulfilled:

　(i) If $u \to^* v$ and $v \to^* w$ then $u \to^* w$

　(ii) If $u \to^* v$ and $v \to^* u$ then $u = v$

　(iii) $u \to^* v$ or $v \to^* u$ $\forall u, v \in V$

How would you construct a graph with n vertices that fulfills the statements?

(b) What does the **out**degree sequence of such graphs look like?

(c) Show, that if a graph fulfills (i)-(iii), there is **exactly one** path P_n that visits every node exactly ones.

Please submit your answers electronically to teaching assistant David (david.schoch@uni-konstanz.de).