Tietorakenteet ja algoritmit II

27.-28.11.2025

Exercise 5

17. How does the execution of the algorithm for finding articulation points in a graph G proceed? $G = \{V = \{\text{a, b, c, d, e, f, g, h, i, j}\}, E = \{\text{(a, d), (a, e), (a, g), (b, h), (b, i), (c, d), (c, h), (d, e), (d, h), (d, i), (e, f), (e, g), (f, g), (h, j), (i, j)}\}\}$? What are the articulation points of the given graph? Assume that the traversal operations *for each* provide vertices in alphabetical order. Simulate the algorithm and compute the values of the elements in the arrays *dfsnumber* and *low*.

18. Draw following undirected graph so that bipartite property is apparent: $G = \{ V = \{$ a, b, c, d, e, f, g, h, i, j, k, l, m, n $\}$, $E = \{$ (a, d), (a, b), (b, c), (b, i), (c, d), (c, l), (e, f), (e, g), (e, j), (f, i), (f, n), (g, m), (h, l), (h, k), (j, m), (k, n) $\}\}$. Find the maximal matching using pen and paper. For matching the last vertices, using augmenting path technique helps a lot.

19. Find the maximum flow in the given graph from vertex S to vertex D. Do all consumers get the power they need? Use augmenting path search (Ford-Fulkerson) in any order you prefer. You will get the most out of the task if you also maintain reverse edges (possibility to retract a choice), but by suitably selecting flows from left to right, even a greedy version will find the correct maximum flow.