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Pearls of Algorithms
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Homework 2

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Exercise 1:

A vertex cover X of a graph $G = (V, E)$ contains for every edge $e \in E$ at least one of its end nodes. A vertex cover $X \subseteq V$ is *minimum* if $|X| \leq |X'|$ for all vertex covers $X' \subseteq V$. Show that in bipartite graphs the size of a maximum matching is equal to the size of a minimum vertex cover.

Exercise 2:

a) Work out the algorithm for the computation of a maximum weighted matching in bipartite graphs in detail.

b) Show that the algorithm MaxWeiMatching can be implemented such that its run time is $O(n^3)$ where $n = |A \cup B|$.

Exercise 3:

Construct a weighted undirected graph with the property that a matching of maximum weight is not a matching of maximum size.

Exercise 4:

Reduce the problem of the computation of a maximum matching in a bipartite undirected graph to the problem of the computation of a maximum flow in a flow network.