Exercise 3

Should be done by Feb. 21

Practical exercises

The framework for practical exercise 3 is for testing impementations of Min-Vertex-Cover. Instead of taking in a graph and a k, this function only takes the graph as input and the output should be the minimum k for which there is a vertex cover of size k.

The output of the function will be a proof of the vertex cover, represented by a vector of integers, specifying which vertices are part of the mimimum vertex cover.

Task 1

Use the divide-and-conquer from observation 3.2.2.6 algorithm for K-Vertex-Cover to create a branch-and-bound solution for Min-Vertex-Cover.

Task 2

Implement solutions using local search and simulated annealing to solve Min-Vertex-Cover. These methods will not find the exact answer, so the goal is get good accuracy using lss time than the exact solution.

Task 3

Combine an inaccurate, fast solution with branch-and-bound, using the inaccurate solution to get a upper bound (described in section 3.4.1, p. 176 of the book).

Theoretical exercises

Exercise 3.3.2.8

Task 1

Assuming that Min-Vertex-Cover is NP-hard, show that Weighted-Min-Vertex-Cover is strongly NP-hard.

Task 2

Show that Longest-(simple)-Path is strongly NP-hard.