Maximum Weight Independent Set

- Given a weighted independent system, find the maximum weight independent set.
- For nonnegative weight, solution can be found from bases.

Minimum Spanning Tree

For a connected graph $G = (V, E)$ with edge weight $c : E \to R$, computing the minimum spanning tree is equivalent to find the maximum weight independent set in the graphic matriod M_G with weight $c^*(e) = c_{\max} - c(e)$, where $c_{\max} = \max_{e \in E} c(e)$.

This is because every maximum weight independent set is a base, i.e., a spanning tree which contains a fixed number of edges.

Greedy Algorithm MAX

Sort all elements in S into ordering

$$c(x_1) \geq c(x_2) \geq \cdots \geq c(x_n).$$

$A \leftarrow \varnothing$;

for $i = 1$ to n do

  if $A \cup \{x_i\} \in \mathcal{C}$

    then $A \leftarrow A \cup \{x_i\}$;

output A.