Matroid Theory Tutorials: (4) Connectivity

Homework

HW 1. Show that a matroid $M_1 \oplus M_2$ is not connected, even if M_1 and M_2 are connected.

HW 2. Show that a matroid M is not connected if and only if $\mathcal{I}(M) = \mathcal{I}(M_1 \oplus M_2)$ where $E(M_1)$ is a subset of E(M) and $E(M_2) = E(M) \setminus E(M_1)$.

HW 3. Let $\{e, f\}$ be a circuit and a cocircuit of a matroid M. Show that $\{e, f\}$ is a connectivity component of M.

Other Exercises

Exercise 1. Design a polynomial-time algorithm that decides if a given matroid M is connected.

Exercise 2. Let $M = (E, \mathcal{I})$ be a connected matriod and $e \in E$. Show that M - e or M/e is also connected.