## Matroid Theory Tutorials: (3) Matroid Algorithms

## Homework

**HW 1.** Let  $M = (E, \mathcal{I})$  be a matroid with a weight function  $w \colon E \to \mathbb{R}$ .

- 1. Show that if w is injective, then there is a unique base of the maximum weight. I.e., the greedy algorithm output a unique solution.
- 2. Show that if w is not injective, then the greedy algorithm can output arbitrary base of the maximum weight.

**HW 2.** Modify the greedy algorithm, that it will find a base B of the maximum weight, such that B contains a fixed indpendent set I.

## **Other Exercises**

**Exercise 1.** Prove that algorithmic version of MATROID INTERSECTION for 3 matroids is an NP-hard problem.