

## Algorithmic Game Theory

Summer Term 2026

### Exercise Set 10

*If you would like to submit your solutions for this problem set, please send them via email to [ahouser1@uni-bonn.de](mailto:ahouser1@uni-bonn.de) by Monday evening. Submitting solutions in groups is also possible.*

#### **Exercise 1:**

Consider a set of  $n$  teams, each with 10 players, where each team owner has a ranking of all  $10n$  players. Define a notion of *stable allocation* in this setting (as in Definitions 21.1 and 21.2) and show how to adapt the top trading cycle algorithm to find a stable allocation. We assume that players' preferences play no role.

#### **Exercise 2:**

We call an allocation  $\pi$  *weakly stable* if there exists no set of agents who can obtain better houses than they are assigned in  $\pi$  by reallocating among themselves the houses allocated to them in  $\pi$ . Show that weak stability follows from stability as defined in Section 1 of Lecture 21.

**Note:** The converse does not hold. For example, if there are two agents who both prefer the same house, the only stable allocation is to give that house to its owner, but the alternative is also weakly stable.

#### **Exercise 3:**

Give an instance of the stable matching problem in which, by lying about her preferences during the execution of the men-proposing algorithm, a woman can end up with a man that she prefers over the man she would have ended up with had she told the truth.

**Note:** Men-proposing is truthful for the participating men. A proof of this can be found in the book by Karlin/Peres book.