Topics in Computational Social Choice 2026: Exercise Sheet #2

Théo Delemazure and Ulle Endriss
Institute for Logic, Language and Computation (ILLC)
University of Amsterdam

Instructions. Write at most one page of text and then email your solutions as a PDF to both instructors no later than **10:00 on Thursday, 8 January 2026**. You are free to discuss this assignment with others and to make use of additional resources in any way that seems reasonable. Always include a short paragraph in which you document what outside help you received and what sources of information you consulted (if any).

The intended workload for this exercise sheet is around two hours of concentrated work.

Exercise 1. Recall that, when you design a voting rule, it is not always possible to achieve resoluteness if we want that voting rule to satisfy the axioms of anonymity and neutrality. For example, we saw in class that this combinations of desiderata is impossible to satisfy when there are two alternatives and two voters.

For this exercise, we focus on elections with *three alternatives* (but any number n of *voters*). Suppose we accept that resoluteness is hard to achieve, but that we at least want to have a voting rule that *never returns a three-way tie* between all three alternatives. We also want it to be *anonymous* and *neutral*. For some values of n this is possible, while for others it is impossible. Provide a full characterisation of when it is possible and when it is impossible. For the cases for which it is possible, define a voting rule that has all the desired properties. For the cases for which it is impossible, prove that this really is so.