

In this thesis we are dealing with the Kidney exchange game, which is a combinatorial model of the problem of distribution of living donors of kidneys to patients. More specifically, having a set of incompatible recipient-donor pairs we want to create a permutation of the donors to obtain pairs compatible for a transplantation. We require that the solution is stable, which essentially means that there is not a group of pairs such that it would be better for all of them to create another permutation just among themselves.

We give an overview of known methods for finding solutions (the Top Trading Cycles algorithm and heuristics) and for testing the stability of a solution. We describe previously known results concerning the hardness of the problem. We propose to seek for a good stable solution by starting with the result of the TTC algorithm and then applying heuristics repeatedly. We use several known heuristics together with two new ones. We present results of a series of tests to show the improvement achieved by the heuristics. We also present a new algorithm for testing the stability of a solution. This algorithm runs significantly faster than the previously known one.