Tutorial 3

JAIO - II

Question 1 (Problem 11 in *toolbox*)**.** A game is called *finite* if it has no infinite plays, i.e. every play ends in a dead end. Show that every finite game is determined, i.e. exactly one of the players has a winning strategy.

Question 2 (Problem 12 in *toolbox*)**.** A *reachability* game is a two player game such that winning condition of one of the players is a reachability condition. Show that reachability games on finite game graphs can be solved in time $O(|E|)$ where E is the set of edges in the game graph.

Question 3 (Problem 20 in *toolbox*)**.** Construct a game with finite arena such that one of the players have a winning strategy, but not a winning finite memory strategy.

Question 4 (Problem 13 in *toolbox*)**.** Show that one player parity games can be solved in PTIME.

Question 5 (Problem 14 in *toolbox*)**.** Show that solving parity games is in (NP $\cap$ coNP). (Hint: Use the previous problem)

Question 6 (Problem 16 and 19 in *toolbox*)**.** A *Muller* game is a game with the winning condition being a Muller condition on the game arena. Are Muller games positionally determined? Are Muller games on finite arenas positionally determined?