

## Introduction to Multi-Agent-Programming

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### Exercise Sheet 11

**Due: February 4th, 2009**

#### Exercise 11.1 (Reinforcement Learning)

(a) **Problem Formulation (1pt, written)**

Consider a game of writing a string with nine chars, each char can have three possible values “X”, “O”, or “-”. Each time, an agent can choose a place to put “X” in the string. Suppose the putting action is stochastic, and there is an oracle, which tells the agent the resulted string after each round, and three possible awards +1, -1, or 0 after some rounds (when the game is terminated). Formulate the description to a Q-Learning problem in a formal form.

(b) **Implementation (2pt, programming)**

Implement the formulated learning algorithm in C++. The implementation should be based on the framework available in the web page.

**Please send your solution to dornhege and zhangd @informatik.uni-freiburg.de**

*Note: We encourage you to submit the written solution in a **pdf** file. The latex template is available at the exercise web page.*