

## Introduction to Multi-Agent-Programming

B. Nebel, A. Kleiner  
C. Dornhege, D. Zhang  
Winter Semester 2008/2009

University of Freiburg  
Department of Computer Science

### Exercise Sheet 12

Due: February 11th, 2009

#### Exercise 12.1 (Ant System)

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

Consider the following map, in which  $A, B, C, D$  are cities, the numbers are the costs for visiting the cells. The task is to find an optimal path started at city  $A$ , visiting all the cities. Each ant can take one of the four actions at a time:  $\leftarrow, \rightarrow, \uparrow, \downarrow$ .

D	2	6	8	C
6	1	9	1	2
3	1	9	1	8
5	1	9	1	3
A	1	1	1	B

Invent an exploration strategy for finding different paths from city to city. And formulate an ant system to solve the problem.

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

Implement the formulated system in C++. Output the optimal path, submit your source code.

**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.*