SAARLAND UNIVERSITY ARTIFICIAL INTELLIGENCE
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Theoretical Exercise Sheet 1

Deadline Friday, April 22, 23:59

About the submission of this sheet.

- As explained in the first lecture, you might submit the solutions to exercises in groups of up to 3 students.
- All students of a group need to be in the same tutorial.
- Since you will only know the tutorial you are assigned to in the beginning of next week, it might be that you work on this sheet before having formed a group.
- You will see that this sheet is not that much of work, so it will be no problem for you to do it alone.
- If you do it alone, this is no problem for future sheets. Just form a group after submitting this first sheet and work in your group starting from the second sheet.
- However, if you have already formed a group when working on this sheet, this is also fine.
- Either way, write down the names of **all** students that have worked on this submission and
- hand it in **one time**, (i.e., determine one student of the group who hands in the solution using his/her account).
- Hand in the solution **in CMS**.

Name 1: _____

Name 2: _____

Name 3: _____

1. (5 points) Which of the following properties describe the characteristics of task environments or agent actions? Mark the properties which we discussed in the lecture.
   - ◯ Known
   - ◯ Dynamic
   - ◯ Episodic
   - ◯ Inaccessible
   - ◯ Sequential
   - ◯ Valid
   - ◯ Rational
   - ◯ Omnipresent

2. (8 points) For each of the following assertions, say whether it is true or false and give a short explanation in 1 or 2 sentences for each of your answers.

   (a) An agent that senses only partial information about the state cannot be perfectly rational.

   (b) There exist task environments in which no pure reflex agent can behave rationally.

   (c) There exists a task environment in which every agent is rational.

   (d) The input to an agent program is the same as the input to the agent function.

   (e) It is possible for a given agent to be perfectly rational in two distinct task environments.

(f) Every agent is rational in an unobservable environment.

(g) A perfectly rational poker-playing agent never loses.

(h) Suppose an agent selects its next action uniformly at random from a set of possible actions. There exists a deterministic task environment in which this agent is rational.

3. (7 points) You are given the following four domains:

   i. A group of people playing poker.
   ii. A person driving a car.
   iii. A machine detecting chocolate bars weighing less than 50g.
   iv. A doctor performing a medical diagnosis.

   Classify each of the domains above along domain the properties that we discussed in the lecture by entering yes/no in the cells of the following table:

	Accessible	Deterministic	Episodic	Static	Discrete	Single agent
Poker						
Car						
Machine						
Doctor						