

## Topics in Artificial Intelligence, Spring 2025

### San Jose State University

#### Assignment 2

**Due date: Friday, February 21, 11:59 p.m.**

**Problem 1 (8 points: each part 2 points):** Identify whether it is true or false and support your answer with examples or counter examples where appropriate.

**1.1:** An agent that senses only partial information about the state cannot be perfectly rational.

**1.2:** A perfectly rational poker-playing agent never loses.

**1.3:** Suppose an agent selects its action uniformly at random from the set of possible actions. There exists a deterministic task environment in which this agent is rational.

**1.4:** There exists a task environment in which every agent is rational.

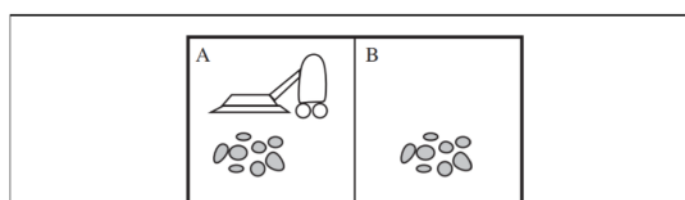
**Problem 2 (7 points):** Give a PEAS (Performance measure, Environment, Actuators, Sensors) description of the task environment of the given activity and characterize its environment.

Hint for characterizing the environment: Identify if it is Fully observable vs. Partially observable, Static vs. Dynamic, etc

**Given activity: Playing soccer**

**Problem 3 (10 points):** Implement a simulator for the vacuum-cleaner world depicted in Figure below.

1. Implement an Agent and an Environment class for this scenario and write a function to simulate and evaluate the agent's performance. The agent should be a simple reflex agent.
2. Determine at least two metrics that should be used to evaluate performance. Run the environment with this agent for all possible initial dirt configurations and agent locations.
3. Record the performance score for each configuration and the overall average score, and present the results (as a chart, as text, etc).



**Figure 2.2** A vacuum-cleaner world with just two locations.