Question 1

1.1.

An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuator.

Single Agent

A single agent environment is an environment that is explored by a single agent. All actions are performed by a single agent in the environment. An example of this would be playing tennis against a ball where there is only one player.

Mutli-Agent

A multi-agent environment is one where two or more agents are present, percieving and performing actions in the environment. The environment may be competitive, or cooperative. An exmple of this would be playing a socer match

1.2.

Deterministic

These are the environments where the next state of the environment is completely predictable from the current state and the action executed by the agent. There is no uncertainty in the environment.

Stochastic

This environment is the opposite of a deterministic environment. The next state is totally unpredictable for the agent. Uncertainty exists due to randomness, lack of good environment model or lack of complete sensor coverage.

1.3. A game of chess is fully observable. In this environment, the agent sensor is able to sense/access the complete state of and agent at each point in time.

There is no need to kep track of the keep track of the history of the surrounding so the game is not necessarily partially observable.

If the agent has no sensors in all environments, the environment would be unobservable which is not the case in a chess game.

Question 2

2.1.

A well-defined problem can be described by:

|  |  |
| --- | --- |
| **A start or initial state** | initial statethat the agent starts in |
| **Actions** | A description of the possibleactionsavailable to the agent. |
| **Transition model** | This is specified by a function . A transition model is a description of what each action does. A successor is any state reachable from a given state by a single action. |
| **Path cost** | function that assigns a numeric cost to a path. Cost of a path is the sum of costs of individual actions along the path |
| **Goal test** | test to determine if at goal state |

2.2.

2.3.

In a search, a graph can be diveded into three parts: nodes explored, nodes to be explored next and the remaining unexplored nodes. The explored set keeps track of the nodes that have already been expanded. This aims to prevent the situation where we might get into an infinite loop, expanding the same nodes over and over.

2.4.

2.5.

Question 3

3.1.

3.2.

3.3.

3.4.

Question 4

4.1.

4.2.

4.3.

Question 5

5.1.

Question 6

6.1.

6.2.

Question 7

7.1.

Question 8

8.1.

8.2.

8.3.

8.4.

Question 9

9.1.

9.2.

9.3.

9.4.