a. artifical intelligence as the study and construction of agent programs that perform well in a given environment for a given agent architecture.

b. The artifical intelligence is a part of both the engineering and scientific fields. Using John McCarthy's defition, it is "the science and engineering of mark intelligent machines."

c. The AI problem that would not get any easier are those belonging to the Non-deterministic Polynomial (NP) class. These intractable problems, do not have an efficient algorithm

2.

a. A state space is a modeling of a problem as a set of states that a problem can be in, include initial and goal state

a search tree is a tree in which the node is the start state and the set of children for each node consists of the states that are reachable by take any action.

search node is a representation of a state in a search tree or graph. It is an abstraction of the configuration of the agent in relation to its environment.

goal is a set of desirable states in the environment the must pass a goal test.

Action are represent as arcs in search problem graph and are the operations that an agent performs

a transition model is a description of what each action does.
The branching factor is the number of children at each node.

b. A world state is how reality is or could be.
A state description is an agent's internal description of a world state
The distinction between abstraction used in state description and search node versus the real world state are important.