1. Define artificial intelligence (AI). Find at least 3 definitions of AI that are not covered in the lecture.

* “The capability of a machine to imitate intelligent human behavior.” -Merriam-Webster
* “The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.” - The English Oxford Living Dictionary.
* “artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.” - The Encyclopedia Britannica.

1. What is the Turing test, and how it is conducted?

The turning test is a test that was conducted with a human interrogator and two responders, one human and one machine. The interrogator would ask the responders equivalent questions and the goal was to distinguish between the human’s answer and the machine’s answer. If the interrogator chose the machines answer to be the ‘human answer’ then the AI would have passed the test.

1. What is the relationship between thinking rationally and acting rationally?

Thinking rationally means following the laws of thought. Whereas acting rationally means that it ‘Acts to achieve the best outcome, if uncertainty the best expected output Is achieved’

Is rational thinking an absolute condition for acting rationally?

1. What is Tarski’s “theory of reference” about?
2. Describe rationality. How is it defined?
3. Consider a robot whose task it is to cross the road. Its action portfolio looks like this: look-back, lookforward, look-left-look-right, go-forward, go-back, go-left and go-right.
   1. While crossing the road, a helicopter falls down on the robot and smashes it. Is the robot rational?
   2. While crossing the road on a green light, a passing car crashes into the robot, preventing it from crossing. Is the robot rational?
4. Consider the vacuum cleaner world described in Chapter 2.2.1 of the textbook. Let us modify this vacuum environment so that the agent is penalized 1 point for each movement.
   1. Can a simple reflex agent be rational for this environment? Explain your answer
   2. Can a reflex agent with state be rational in this environment? Explain your answer.
   3. Assume now that the simple reflex agent (i.e., no internal state) can perceive the clean/dirty status of both locations at the same time. Can this agent be rational? Explain your answer. In case it can be rational, design the agent function.
5. Consider the vacuum cleaner environment shown in Figure 2.3 in the textbook. Describe the environment using properties from Chapter 2.3.2, e.g. episodic/sequential, deterministic/stochastic etc. Explain selected values for properties in regards to the vacuum cleaner environment.
6. Discuss the advantages and limitations of these four basic kinds of agents:
   1. Simple reflex agents
   2. Model-based reflex agents
   3. Goal-based agents
   4. Utility-based agents