

SCIE300 Reading Assignment 5 (RA5)

90 points

Question 1 (5 points)

In artificial intelligence, what is meant by *reinforcement learning*?

Question 2 (5 points)

Give an example of an action or behavior of the AlphaGo program that gives the appearance of human or super-human intuition.

Question 3 (10 points)

Consider the following subsections of Tegmark's chapter 3: *AI for Space Exploration, AI for Finance, AI for Manufacturing, AI for Transportation, AI for Energy, AI for Healthcare, AI for Communication*. Which of these areas do you think has the best potential for positive impact on human society? Justify your answer.

Question 4 (20 points)

Consider the following statement: "It is likely that computers will replace the majority of human jobs within the next few decades." In a brief paragraph, summarize the argument *in favor* of this statement. In a second brief paragraph, summarize the argument *against* this statement. In both paragraphs, give specific evidence from Tegmark's chapter 3.

The remaining questions refer to Chapter 7.

Question 5 (5 points)

Give an example of a physical law that can be formulated as an optimization. Explain this formulation in one or two sentences.

Question 6 (10 points)

According to the second law of thermodynamics, the total amount of entropy (which we can think of as disorder, randomness, or messiness) in a system must increase over time. However, we know that an adult human grows from a single cell, creating a complex system with low entropy (i.e. a large amount of structure and order). Thus, it might appear that the entropy of an organism such as a human decreases over time, contradicting the second law of thermodynamics. What is the resolution of this apparent paradox?

Question 7 (20 points)

Suppose a researcher has succeeded in creating a superintelligent AI system called "SuperIntelligent System," or SIS for short. Consider each of the following scenarios, and write a brief paragraph for each scenario explaining why that scenario could be problematic or dangerous for humanity.

- (a) SIS is programmed to maximize peace among all intelligent beings.
- (b) SIS is programmed to accumulate gold for the researcher who created SIS.

Question 8 (5 points)

Give an example of a physical system that is not alive but nevertheless exhibits goal-oriented behavior.

Question 9 (10 points)

State an ethical principle that you employ in your own life for making moral decisions. Then, in a brief paragraph, discuss any potential weaknesses this principle may have if a superintelligent AI were programmed to employ that principle. If there are no potential weaknesses, explain why.