



1st Theoretical Assignment in Artificial Intelligence (WS 2006/2007)

Issued: October 26, 2006

Due: November 2, 2006

Note: You need not hand these exercises in, and they are not graded. But bring your solutions to the tutorials on Friday 3rd, where they will be discussed. The questions in the minitests at the beginning of the tutorials will be based on these topics.

Exercise 1.1 (10 P)

1. Define the concept *machine*. (5 P)
2. Use this definition to discuss whether human beings can be considered as machines. (5 P)

Exercise 1.2 (15 P)

1. Do you think that a pile of stones and toilet paper can think? (3 P)
2. Briefly discuss whether computers can think. (6 P)
3. Weizenbaum (*Computer Power and Human Reason*, Chapter 2, 1976) has shown how a construction made from stones and toilet paper can be used to simulate a Turing machine (and thus computation). Does this change your answers to 1 and 2? Discuss your answer. (6 P)

Exercise 1.3 (15 P)

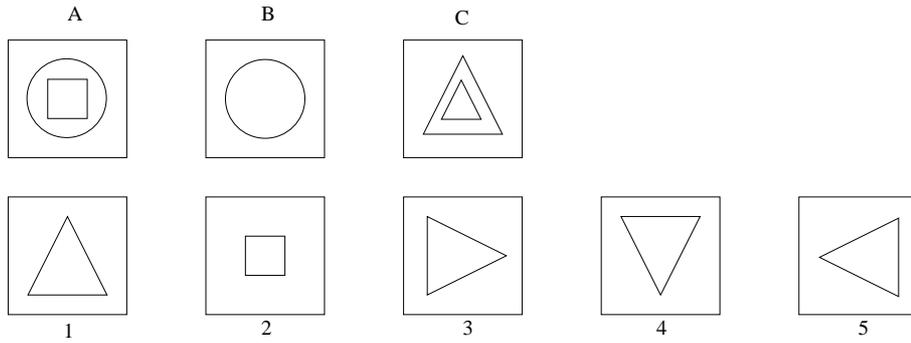
Briefly discuss the four different forms of agents illustrated in the lecture. Name the abilities of the particular type and give examples for problems it can/cannot solve. Can you imagine other forms of agents? Show advantages of this *new* form of agent.

Exercise 1.4 (20 P)

1. What is a *Turing test*? (5 P)
2. Give four questions you would ask in a Turing test. Discuss why you pick these questions. (10 P)
3. Discuss whether the Turing test is appropriate to decide if computers can think. (5 P)

Exercise 1.5**(30 P)**

Consider the following analogy test:



1. Give a symbolic representation for each of the figures A-C, 1-5. Assume that a database exists with the prototypical objects **SQUARE**, **CIRCLE** and **TRIANGLE**. (15 P)

What kind of problems do you encounter when applying the technique presented in the lecture to specify the objects and relations? (5 P)

2. Give a symbolic specification for each of the following transformations

$$A \rightarrow B, C \rightarrow 1, \dots, C \rightarrow 5. \quad (5 P)$$

3. Generalise the symbolic specifications for each pair of transformation rules

$$(A \rightarrow B, C \rightarrow 1), \dots, (A \rightarrow B, C \rightarrow 5)$$

Which figure do you obtain using the schema described in the lecture? Which figure would you have chosen? (5 P)

Exercise 1.6**(10 P)**

Consider a human, who understands only English, equipped with a English rule book that includes instructions on how to manipulate Chinese symbols, and sheets of blank papers. The person sits in a room with a small opening to the outside. Through the opening appear slips of paper with (for our human) indecipherable Chinese symbols. The human finds matching symbols in the rule book, and, by following the instructions, eventually writes Chinese symbols on a paper slip. Then, he passes back the paper slip to the outside world. The first paper slip was a Chinese question, and the second paper slip is the appropriate Chinese answer.

Discuss controversially if the described system can be considered as understanding Chinese. (pros: 5P, cons: 5P)