Kennissystemen Re-examination
June 30, 2004
13:30 – 16:30

This exam consists of 5 questions on 2 pages.

Credits:

1a	1b	2a	2b	2c	3a	3b	4a	4b	5a	5b
10	5	5	5	15	5	5	10	10	10	10

Grade = (points + 10) / 10

Be sure to answer all sub-questions. Good luck!

Question 1: Basic principles

a) Knowledge systems can only be successfully applied when some preconditions are met. List four success factors for knowledge systems.
b) Explain what an analogue (or direct, or vivid) representation is. Give an example of an analogue representation.

Question 2: Uncertainty

Certainty factors are a mechanism to cope with uncertainty in rule-based systems.
a) Describe two problems of certainty factors.

Wednesday June 23 was a thrilling day for the Dutch team at the European Football Championship in Portugal. Whether or not the Dutch team would continue to the quarter-finals did not only depend on the results of the game Netherlands – Latvia, but also on the results of Germany – Czech. We could (incompletely) model this uncertainty with certainty factors as follows.

The abbreviations **GW / GL / GD / GtQ** stand for Germany Wins / Looses / Draws / to Quarter-finals respectively, while **NW / NL / ND / NtQ** stand for the Netherlands Wins / Looses / Draws / to Quarter-finals. The numbers between brackets behind the rules and facts represent the certainty factors.

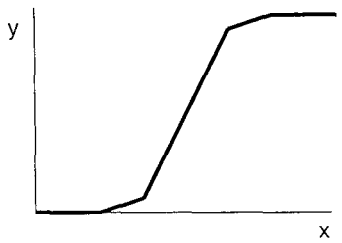
IF **GW** THEN **GtQ**	(1.0)
IF **GtQ** THEN **NtQ**	(-1.0)
IF (**GL** AND **ND**) THEN **NtQ**	(0.5)
GW	(0.8)
GL	(-0.5)
ND	(0.2)

b) What does the second line say? Give your answer by rephrasing the rule in natural language. Be sure to take the certainty factor into account.

c) Calculate the certainty factor for the fact that the Netherlands will continue to the quarter-finals (**NtQ**). Show you calculations.

Question 3: Vagueness

"Fuzzy" definitions are a manner to cope with vagueness. Fuzzy sets are often represented via a diagram as shown below:



a) What is represented by the y-axis of such a diagram?
b) Suppose that the diagram above defines the concept "smart". Show in a drawing how you could express the concept "very smart" using a "hedge" (modifier).

Question 4: Configuration

a) Explain what a functional abstraction hierarchy of parts is, and why such a hierarchy can be useful for configuration tasks. Give an example as well.
b) Describe the "propose-and-revise" method for configuration (MCF3).

Question 5: Diagnosis

a) Explain what can be the role of calculating the "information value" (*Shannon entropy)* in a diagnosis process.
b) Explain what successive fault-models (*concentric closed-world assumptions*) are. Give an example of a diagnosis tasks for which such a fault model is useful.

End of exam.