

Name:

Student Number:

Assessment: 20 points for each question

Exercise 1: Basic Concepts

- a. Explain the difference between the **task** and the **domain** of a knowledge-based system to be designed. Give two examples that illustrate the re-use of components as a result of this distinction.
- b. According to Newell (1982) knowledge is whatever can be ascribed to an agent, such that its behavior can be explained in terms of the principle of rationality. What is the **principle of rationality**?

Exercise 2: Knowledge Acquisition

- a. What is **participatory design**?
- b. Name at least four **stakeholders** in the design process. What is their role in the design process? What is their primary interest?

Exercise 3: Production Rules

- a. What is **conflict resolution**? Name five conflict resolution strategies.
- b. One of the advantages of production rules is that they make knowledge transparent, also for the end user. Explain how you can answer so called '**How?**' and '**Why?**' questions using production rules and forward and backward chaining.

Exercise 4: Time and Space

This table lists Allen's (1984) seven relations between time intervals.

Relation	Condition	Symbol
X before Y	$X_+ < Y_-$	$<$
X equals Y	$X_- = Y_-, X_+ = Y_+$	$=$
X meets Y	$X_+ = Y_-$	m
X overlaps Y	$X_- < Y_-, X_+ > Y_-, X_+ < Y_+$	o
X during Y	$(X_- < Y_-, X_+ \leq Y_+) \text{ OR } (X_- \geq Y_-, X_+ < Y_+)$	d
X starts Y	$X_- = Y_-, X_+ < Y_+$	s
X finishes Y	$X_+ = Y_+, X_- < Y_-$	f

Table 1: Allen's seven interval relations

Allen's time reasoning makes use of a **composition table**, which allows two relations $R \subseteq A \times B$ and $S \subseteq B \times C$ to be combined into a new relation $R \circ S$ based on the available information. A part of the composition table is given here.

$R \setminus S$	$<$	$>$	d	m
$<$	$<$	...	$<, o, m, d, s$	...
$>$	any	$>$	...	...
d	$<$	...	...	$<, m$
m	...	...	...	...

- Complete the missing parts of the table, in place of the '...'.
- What is the difference between the concepts **linear time** and **branching time**? Which concept of time would you select for building a 'surveillance robot'?

Exercise 5: Uncertainty and Vagueness

- A doctor knows that the illness 'meningitis' (M) causes a stiff neck (S) in 50% of the cases. The chance that a patient will get meningitis anyway is 1 out of 50.000. The chance that a patient will get a stiff neck is estimated at 1 out of 20. Determine the **conditional probability** that a patient has meningitis, given that she has a stiff neck.
- Given is the following 'fuzzy' definition of the concept 'rich'. Show in the drawing how you could express the notion of 'a little rich', using a so-called **'hedge'**.

