

THE UNIVERSITY OF AUCKLAND**SECOND SEMESTER, 2008****Campus: City****COMPSCI.367****The Practice of Artificial Intelligence****(Time allowed: 45 minutes)**

This test is out of **100** marks.

Attempt **ALL** questions.

Write your answers in the space provided in this booklet. There is space at the back for answers that overflow the allotted space.

The use of calculators is **NOT** permitted.

Surname (Family Name):	
First Name(s):	
UoA ID Number:	
Login Name (UPI):	

Section	Mark	Marks Available
A		60
B		40
Total		100

Print Name:

PART A: Knowledge Engineering

Question 1

A Knowledge Engineer needs knowledge or understanding of three main areas, list them:
[6 marks]

1.

2.

3.

Question 2

In the AI documentary we watched John Searle introduce the story of the *Chinese Room*. Briefly describe the implication of the Chinese Room for AI.
[10 marks].

Continued...

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Question 3

What is the *knowledge elicitation bottleneck* and what are its causes?

[6 marks]

Question 4

What is heuristic knowledge? Give an example.

[5 marks]

Question 5

Not all knowledge is suitable for inclusion in a knowledge based system. Is dynamic knowledge suitable or not? Please explain your answer.

[5 marks].

Continued...

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Question 6

List four advantages of knowledge level modeling [8 marks].

1)

2)

3)

4)

Question 7

Create a semantic network to describe a car. Your network should include the concepts: *car*, *person*, *engine*, *fuel*, *fuel tank*, and *road*.

[12 marks]

[1 mark for each correct concept and 1 mark for each correct relations to a maximum of 12]

Question 8

Continued...

Print Name: _____

Define a CLIPS rule for the following pseudocode [4 marks]

```
IF the animal is a dog
THEN the sound made is woof
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Question 9

What happens if you define two rules in CLIPS both called *dog* [4 marks]

Continued...

Print Name:

PART B: Machine Learning

Question 10

What sort of bias does the decision tree learner have?

[4 marks]

There are two types of bias, search (or preference) bias and restriction (or language) bias. A decision tree learner has a search bias because it incompletely searches a complete hypothesis space. Whereas a restriction bias completely searches an incomplete hypothesis space.

Question 11

Is it possible to have a bias-free learner? Please explain why or why not.

[4 marks]

A bias free learner would not be able to predict a value for unseen instances. To be able to do that you would need to have a bias. A bias free learner is able to predict values for previously seen examples. This is an example of rote learning like a data base.

Continued...

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Question 12

What is the complete set of hypothesis in the version space, if the S set and G set are as follows:

$S: \{ \langle \text{Blue}, \text{Square}, \text{Small}, \text{Wet} \rangle \}$
 $G: \{ \langle \text{Blue}, ?, ?? \rangle, \langle ?, ?, \text{Small}, ? \rangle \}$

[10 marks]

$\langle \text{Blue}, \text{Square}, \text{Small}, \text{Wet} \rangle$

$\langle \text{Blue}, \text{Square}, \text{Small}, ? \rangle$ $\langle \text{Blue}, \text{Square}, ?, \text{Wet} \rangle$ $\langle \text{Blue}, ?, \text{Small}, \text{Wet} \rangle$ $\langle ?, \text{Square}, \text{Small}, \text{Wet} \rangle$

$\langle \text{Blue}, \text{Square}, ?, ? \rangle$ $\langle \text{Blue}, ?, \text{Small}, ? \rangle$ $\langle \text{Blue}, ?, ?, \text{Wet} \rangle$ $\langle ?, \text{Square}, \text{Small}, ? \rangle$ $\langle ?, ?, \text{Small}, \text{Wet} \rangle$

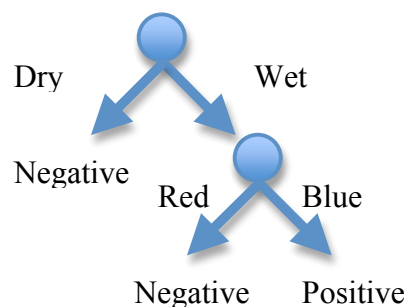
$\langle \text{Blue}, ?, ?, ? \rangle$ $\langle ?, ?, \text{Small}, ? \rangle$

Question 13

What decision tree would be learned with the following data?

Blue	Square	Large	Wet	Positive
Blue	Square	Small	Dry	Negative
Blue	Square	Small	Wet	Positive
Blue	Triangle	Large	Dry	Negative
Blue	Triangle	Large	Wet	Positive
Red	Triangle	Large	Wet	Negative

[10 marks]



Continued...

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Question 14

What is the relationship between Machine Learning and Search?

[4 marks]

With the exception of naïve bayes, all the machine learning algorithms are based on search. They all search through the hypothesis space looking for the most suitable hypothesis. This might be a complete search of an incomplete hypothesis space or a incomplete search of a complete hypothesis space, but they are all based on search methods.

Question 15

Can you draw the decision tree that generated these rules:

If color=Blue & shape=Triangle then positive

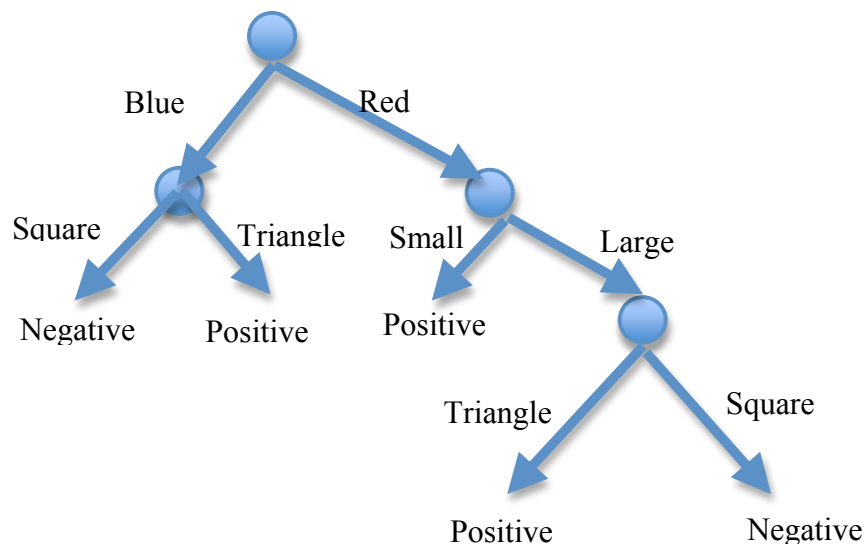
If color=Blue & shape=Square then negative

If color=Red & size=small then positive

If color=Red & size=large & shape=Triangle then positive

If color=Red & size=large & shape=Square then negative

[8 marks]



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Print Name:

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