CS2LAP: Logic and Prolog 2000/2001	**Handed out: 28/09/00**
Coursework 1	**Due date: 09/10/00**

Note. For the questions involving truth tables, please use the symbols $\top$ (top) and $\bot$ (bottom) and construct tables *only* according to the following pattern:

A	B	*formula*
$\top$	$\top$	...
$\top$	$\bot$	
$\bot$	$\top$	
$\bot$	$\bot$	

A	B	C	*formula*
$\top$	$\top$	$\top$	...
$\top$	$\top$	$\bot$	
$\top$	$\bot$	$\top$	
$\top$	$\bot$	$\bot$	
$\bot$	$\top$	$\top$	
$\bot$	$\top$	$\bot$	
$\bot$	$\bot$	$\top$	
$\bot$	$\bot$	$\bot$	

etc.

Question 1. Using truth tables, show the validity of the following equivalences:

(a) $A \Rightarrow B \;\equiv\; \neg B \Rightarrow \neg A$

(b) $A \Rightarrow \neg B \;\equiv\; \neg(A \wedge B)$

Marks: 10 (5 each)

Question 2. Can the following statements all be true?

> The television is switched on. If the television is switched on and has power then there is a picture. There is no picture.

Justify your answer using a truth table.

Marks: 10

Question 3. Three runners A, B, C had a race and finished almost at the same time. Three sports commentators gave the following immediate reports:

(i) A has won.

(ii) B has not won.

(iii) C was not the last.

It turned out that exactly one of the commentators was right. What was the result of the race? Briefly justify your answer.

Marks: 10

Question 4. When writing about Prolog please make sure you are clearly distinguishing between capitals and lowercase letters.

(a) Which of the following are valid Prolog atoms?

`f, loves(john,mary), Mary, _c1, 'Hello', this_is_it`

(b) Which of the following are valid names for Prolog variables?

`a, A, Paul, 'Hello', a_123, _, _abc, x2`

(c) What would a Prolog interpreter reply given the following query?

```
?- f( a, b) = f( X, Y).
```

(d) Would the following query succeed?

```
?- loves( mary, john) = loves( John, Mary).
```

Why?

(e) Assume a program consisting only of the fact

```
a( B, B).
```

has been consulted by Prolog. How will the system react to the following query?

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?- a( 1, X), a( X, Y), a( Y, Z), a( Z, 100).
```

Why?

Marks: 20 (4 each)