4CCS1ELA: Tutorial list 2

1. We saw the binary connective | (the *Sheffer stroke*) in Tutorial list 1. Its truth-table is given below.

P	Q	$P\|Q$
1	1	0
0	1	1
1	0	1
0	0	1

Define $\wedge$, $\vee$, $\neg$ and $\rightarrow$ using $|$.

Hint: Look at the truth-table for $P|P$ too!

2. Consider the formula:

$$(P \vee \neg R) \rightarrow \neg(\neg Q \vee R)$$

(i) Obtaining CNF and DNF formulas from truth-tables.

a) Write a conjunctive normal form (CNF) for this formula from its truth-table.

b) Write a disjunctive normal form (DNF) for this formula from its truth-table.

(ii) Transform this formula to a logically equivalent disjunctive normal form (DNF) using the rewrite rules.

3. Rewrite the following propositional formula:

$$(P \rightarrow Q) \ \wedge \ \neg(S \ \rightarrow \ R)$$

(i) As a logically equivalent formula in *conjunctive normal form*; and

(ii) As a logically equivalent formula in *disjunctive normal form*