1) (a) Complete the following truth table.

p	q	....	$p \Rightarrow \neg q$
T	T	F	....
T	F	T	....
F	T	F	....
F	F	T	....

[2 marks]

Consider the propositions

p: Cristina understands logic
q: Cristina will do well on the logic test.

(b) Write down the following compound proposition in symbolic form.

"If Cristina understands logic then she will do well on the logic test"   *[2 marks]*

(c) Write down in words the contrapositive of the proposition given in part (b).   *[2 marks]*

2) (a) Complete the truth table shown below.   *[3 marks]*

p	q	$p \wedge q$	$p \vee (p \wedge q)$	$(p \vee (p \wedge q)) \Rightarrow p$
T	T			
T	F			
F	T			
F	F			

(b) State whether the compound proposition $(p \vee (p \wedge q)) \Rightarrow p$ is a contradiction, a tautology or neither.   *[1 mark]*

Consider the following propositions.

p: Feng finishes his homework
q: Feng goes to the football match

(c) Write in symbolic form the following proposition.

If Feng does not go to the football match then Feng finishes his homework.   *[2 marks]*

3)   Consider two propositions p and q.

(a)   Complete the truth table below.   *[4 marks]*

p	q	$\neg q$	$p \Rightarrow \neg q$	$\neg p$	$\neg p \Rightarrow q$
T	T				
T	F				
F	T				
F	F				

(b)   Decide whether the compound proposition

$$(p \Rightarrow \neg q) \Leftrightarrow (\neg p \Rightarrow q)$$

is a tautology. State the reason for your decision.   *[2 marks]*

4)   Consider the statement p:

"If a quadrilateral is a square then the four sides of the quadrilateral are equal".

(a)   Write down the inverse of statement p in words.   *[2 marks]*

(b)   Write down the converse of statement p in words.   *[2 marks]*

(c)   Determine whether the converse of statement p is always true. Give an example
      to justify your answer.   *[2 marks]*

5)   Consider the two propositions p and q.

p: The sun is shining q: I will go swimming

Write in words the compound propositions

(a) $p \Rightarrow q$;   *[2 marks]*

(b) $\neg p \vee q$.   *[2 marks]*

The truth table for these compound propositions is given below.

p	q	$p \Rightarrow q$	$\neg p$	$\neg p \vee q$
T	T	T		T
T	F	F		F
F	T	T		T
F	F	T		T

(c)   Complete the column for $\neg p$.   *[1 mark]*

(d)   State the relationship between the compound propositions $p \Rightarrow q$ and $\neg p \vee q$.   *[1 mark]*

6)   Let p and q represent the propositions

p: food may be taken into the cinema

q: drinks may be taken into the cinema

(a)   Complete the truth table below for the symbolic statement $\neg (p \vee q)$.   *[2 marks]*

p	q	$p \vee q$	$\neg (p \vee q)$
T	T		
T	F		
F	T		
F	F		

(b)   Write down in words the meaning of the symbolic statement $\neg (p \vee q)$.   *[2 marks]*

(c)   Write in symbolic form the compound statement: *[2 marks]*

"no food and no drinks may be taken into the cinema".

7)   (a)   (i)   Complete the truth table below.

p	q	$p \wedge q$	$\neg(p \wedge q)$	$\neg p$	$\neg q$	$\neg p \vee \neg q$
T	T			F	F	
T	F			F	T	
F	T			T	F	
F	F			T	T	

(ii)   State whether the compound propositions $\neg(p \wedge q)$ and $\neg p \vee \neg q$
are equivalent.   *[4 marks]*

Consider the following propositions.

p: Amy eats sweets
q: Amy goes swimming.

(b)   Write, in symbolic form, the following proposition.   *[2 marks]*

Amy either eats sweets or goes swimming, but not both.