

1)

QUESTION 2

(a)

p	q	$\dots \neg q \dots$	$p \Rightarrow \neg q$
T	T	F	$\dots \mathbf{F} \dots$
T	F	T	$\dots \mathbf{T} \dots$
F	T	F	$\dots \mathbf{T} \dots$
F	F	T	$\dots \mathbf{T} \dots$

(A1)(A1) (C2)

Note: Award (A1) for $\neg q$, (A1) for last column.

(b) $p \Rightarrow q$

(A1)(A1) (C2)

Note: Award (A1) for \Rightarrow , (A1) for p and q in the correct order.

(c) If Cristina does not do well on the logic test then she does not understand logic.

(A1)(A1) (C2)

Note: Award (A1) for If...(then), must be an implication, (A1) for the correct propositions in the correct order.

2)

QUESTION 2

(a)

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

(A1)(A1)(ft)(A1)(ft) (C3)

Note: Award (A1) for each correct column.

(b) tautology

(A1)(ft) (C1)

Note: Follow through from their last column.

(c) $\neg q \Rightarrow p$

(A1)(A1) (C2)

Note: Award (A1) for $\neg q$ and p in correct order, (A1) for \Rightarrow sign.

3)

QUESTION 3

(a)

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

(AI)(AI)(ft)

(AI)(AI)(ft)

(C4)

Note: Award (AI) for each correct column (second column (ft) from first, fourth (ft) from third). Follow through from second column to fourth column for a consistent mistake in implication.

- (b) Since second and fourth columns are not identical
 \Rightarrow Not a tautology

(R1)(ft)

(AI)(ft)

(C2)

[6 marks]

Note: (R0)(AI) may not be awarded.

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4)

QUESTION 7

- (a) If a quadrilateral is not a square (then) the four sides of the quadrilateral are not equal.

(AI)(AI)

(C2)

Note: Award (AI) for “if...(then)”, (AI) for the correct phrases in the correct order.

- (b) If the four sides of the quadrilateral are equal (then) the quadrilateral is a square.

(AI)(AI)(ft)

(C2)

Note: Award (AI) for “if...(then)”, (AI)(ft) for the correct phrases in the correct order.

Note: Follow through in (b) if the inverse and converse in (a) and (b) are correct and reversed.

- (c) The converse is not always true, for example a rhombus (diamond) is a quadrilateral with four equal sides, but it is not a square.

(AI)(R1)

(C2)

Note: Do not award (AI)(R0).

[6 marks]

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5) QUESTION 2

- (a) If the sun is shining then I will go swimming. (AI)(AI) (C2)

Note: Award (AI) for “if...then” and (AI) for correct order.

- (b) Either the sun is not shining or I will go swimming. (AI)(AI) (C2)

Note: Award (AI) for both correct statements and (AI) for “either” “...or”.

- (c)

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

(AI) (C1)

- (d) They are (logically) equivalent. (AI) (C1)

Note: Do not accept any other answers.

[6 marks]

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6)

Q4.

(a)

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

(AI)
(AI)(ft)

(AI) for each correct column

(C2)

(b)

It is not true that food or drinks may be taken into the cinema.
(AI) for “it is not true”. (AI) for “food or drinks”.

OR

Neither food nor drinks may be taken into the cinema.
(AI) for “neither”. (AI) for “nor”.

OR

No food and no drinks may be taken into the cinema.
(AI) for “no food”, “no drinks”. (AI) for “and”.

OR

No food or drink may be brought into the cinema.
(AI) for “no”, (AI) for “food or drink”
Do not penalize for use of plural / singular
Note: the following answers are incorrect:
No food **and** drink may be brought into the cinema. Award (AI) (A0)
Food **and** drink may not be brought into the cinema. Award (AI) (A0)
No food **or** no drink may be brought into the cinema. Award (AI) (A0)

(A2)

(C2)

(c)

$\neg p \wedge \neg q$
(AI) for both negations, (AI) for conjunction.

OR

$\neg(p \vee q)$
(AI) for negation, (AI) for $p \vee q$ in parentheses.

(AI)(AI)

(C2)

[6 marks]

[6 marks]

7)

Q1

(a) (i)

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

(A3)

Award (A1) for $p \wedge q$ column correct, (A1)(ft) for $\neg(p \wedge q)$ column correct, (A1) for last column correct.

(ii) Yes.

(R1)(ft)

*(ft) from their second and the last columns
Must be correct from their table*

(C4)

(b) $p \vee q$.

(A1)(A1)

Award (A1) for $p \dots q$, (A1) for \vee

Accept $(p \vee q) \wedge \neg(p \wedge q)$ or $(p \vee q) \wedge (\neg p \vee \neg q)$

(C2)

[6 marks]