

Homework 1 for ECS 20

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This assignment was made with ♡ (and L^AT_EX).

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1 Question 1

p	q	r	$\neg q$	$\neg r$	$r \Rightarrow \neg q$	$p \wedge \neg r$	$\neg(r \Rightarrow \neg q) \vee (p \wedge \neg r)$
1	1	1	0	0	0	0	1
1	1	0	1	0	1	1	1
1	0	1	0	1	1	0	0
1	0	0	1	1	1	1	1
0	1	1	0	0	0	0	1
0	1	0	1	0	1	0	0
0	0	1	0	1	1	0	0
0	0	0	1	1	1	0	0

2 Question 2

2.1 part 1

p	q	r	$p \Rightarrow q$	$(p \Rightarrow q) \Rightarrow r$	$q \Rightarrow r$	$p \Rightarrow (q \Rightarrow r)$
1	1	1	1	1	1	1
1	1	0	1	0	0	0
1	0	1	0	1	1	1
1	0	0	0	1	1	1
0	1	1	1	1	1	1
0	1	0	1	0	0	1
0	0	1	1	1	1	1
0	0	0	1	0	1	1

The two statements are not equal.

2.2 part 2

1. $(q \wedge (p \Rightarrow \neg q)) \Rightarrow \neg p \longrightarrow$ Original statement.
2. $(q \wedge (\neg p \vee \neg q)) \Rightarrow \neg p \longrightarrow$ Implication into not and or.
3. $(q \wedge \neg p) \vee (q \wedge \neg q) \Rightarrow \neg p \longrightarrow$ Distributive property.
4. $(q \wedge \neg p) \vee (F) \Rightarrow \neg p \longrightarrow$ Converting to falsehoods.
5. $(q \wedge \neg p) \Rightarrow \neg p \longrightarrow$ False or statement is just statement.
6. $\neg(q \wedge \neg p) \vee \neg p \longrightarrow$ Implication into not and or.
7. $(\neg q \vee p) \vee \neg p \longrightarrow$ De Morgan's law.

8. $\neg q \vee (p \vee \neg p) \longrightarrow$ Associative Property.
9. $\neg q \vee (T) \longrightarrow$ Converting to Truth
10. $(T) \longrightarrow$ Truth or anything is just truth.

3 Question 3

3.1 part 1

As an implication: If the weather changed very rapidly, then a tornado would have touched down on Davis last week.

3.2 part 2

As a converse: If a tornado touched down on Davis last week, then the weather has changed very rapidly.

3.3 part 3

As a contrapositive: If a tornado didn't touch down on Davis last week, then the weather isn't changing rapidly.

4 Question 4

A	B	B is a knave	One is a knight	Consistent?
Knight	Knave	True	True	Not possible
Knave	Knight	False	True	Possible

A is a Knave and B is a Knight.

5 Answers

My answer for 1 , 2 , 2.1 , 2.2 , 3 , 3.1 , 3.2 ,3.3, 4 are on pages ii and iii.