

CISC 2210 Discrete Structures - Noson S. Yanofsky

Student: Ruslan Pantaev

March 10, 2018

2.2

1.

Give the converse and contrapositive for each of the following propositions:

(a)

$$p \rightarrow (q \wedge r)$$

converse: $(q \wedge r) \rightarrow p$

contrapositive: $\neg(q \wedge r) \rightarrow \neg p$

(b)

if $x + y = 1$, then $x^2 + y^2 \geq 1$

converse: if $x^2 + y^2 \geq 1$, then $x + y = 1$

contrapositive: if $x^2 + y^2 \not\geq 1$, then $x + y \neq 1$

(c)

if $2 + 2 = 4$, then $3 + 3 = 8$

converse: if $3 + 3 = 8$, then $2 + 2 = 4$

contrapositive: if $3 + 3 \neq 8$, then $2 + 2 \neq 4$

3.

Consider the following propositions:

(a)

Which proposition is the converse of $p \rightarrow q$?

$$q \rightarrow p$$

(b)

Which proposition is the contrapositive of $p \rightarrow q$?

$$\neg q \rightarrow \neg p$$

(c)

Which propositions are logically equivalent to $p \rightarrow q$?

$$\begin{aligned}\neg p \vee q \\ \neg q \rightarrow \neg p \\ \neg(p \wedge \neg q)\end{aligned}$$

9.

Construct the truth table for $[(p \vee q) \wedge r] \rightarrow (p \wedge \neg q)$

p	q	r	$[(p \vee q) \wedge r]$	\rightarrow	$(p \wedge \neg q)$
0	0	0	0	1	0
0	0	1	0	1	0
0	1	0	1	1	0
0	1	1	1	0	0
1	0	0	1	1	1
1	0	1	1	1	1
1	1	0	1	1	0
1	1	1	1	0	0

11.

Construct truth table for:

(a)

$$\neg(p \vee q) \rightarrow r$$

p	q	r	\neg	$(p \vee q)$	$\rightarrow r$
0	0	0	1	0	0
0	0	1	1	0	1
0	1	0	0	1	1
0	1	1	0	1	1
1	0	0	0	1	1
1	0	1	0	1	1
1	1	0	0	1	1
1	1	1	0	1	1

12.

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)