

CSCE 222

Homework 1

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SECTION 1.1

12 h)

$\sim q + (\sim p \cdot q)$ Where ($p \equiv$ The election is decided) and ($q \equiv$ The votes have been counted).

$\sim q + (\sim p \cdot q) \equiv$ the votes have not been counted or the election has not been decided and the votes have not been counted.

30 a)

If it snows tonight (p), then I will stay at home (q).

Converse: $q \rightarrow p$, if I stay home, then it snowed tonight.

Contrapositive: $\sim p \rightarrow \sim q$, if it does not snow tonight, then I will not stay home.

Inverse: $\sim q \rightarrow \sim p$, if I am not home, then it did not snow tonight.

34 e)

p	q	$(q \rightarrow \sim p)$	$(p \leftrightarrow q)$	$(q \rightarrow \sim p) \leftrightarrow (p \leftrightarrow q)$
T	T	F	T	F
T	F	F	F	T
F	T	T	F	F
F	F	F	T	F

Fig. 1. Truth table for given proposition.

SECTION 1.2

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p "The user enters a valid password"

q "Access is granted"

r "The user has paid the subscription fee"

b) : "Access is granted(q) whenever(\rightarrow) the user has paid the subscription fee(r) and(\cdot) enters a valid password(p)."

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

c) : "Access is denied(q') if(\rightarrow) the user has not paid the subscription fee(r')."

$$q' \rightarrow r'$$

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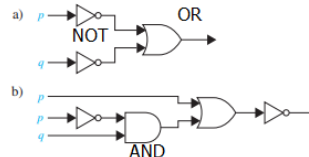


Fig. 2. Logic gates.

a) :

$$p' + q'$$

b) :

$$(p'q + p)'$$

SECTION 1.3

4 a)

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

Fig. 3. Truth table for given proposition.

12 a)

p	q	$(p \vee q)$	$[\sim p \wedge (p \vee q)]$	$[\sim p \wedge (p \vee q)] \rightarrow q$
T	T	T	F	T
T	F	T	F	T
F	T	T	T	T
F	F	F	F	T

Fig. 4. Truth table for given proposition.

c)

p	q	$(p \rightarrow q)$	$[p \wedge (p \rightarrow q)]$	$[p \wedge (p \rightarrow q)] \rightarrow q$
T	T	T	T	T
T	F	F	F	T
F	T	T	F	T
F	F	T	F	T

Fig. 5. Truth table for given proposition.

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

Fig. 6. Truth table for given proposition.

$$\therefore \boxed{(p \rightarrow q) + (p \rightarrow r) \equiv p \rightarrow (q + r)}$$