الجامعة المصرية
للتعلم الإلكتروني الأهلية

EELU
THE EGYPTIAN E-LEARNING UNIVERSITY

GEN206
Discrete Mathematics

Section01

Faculty of Information Technology
Egyptian E-Learning University

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2. Which of these are propositions? What are the truth values of those that are propositions?

a) Do not pass go.
b) What time is it?
c) There are no black flies in Maine.
d) $4 + x = 5$.
e) The moon is made of green cheese.
f) $2^n \geq 100$.

Solution

A: not a proposition
B: not a proposition
C: proposition, false
D: not a proposition
E: proposition, false
F: not a proposition

5. What is the negation of each of these propositions?

a) Mei has an MP3 player.
b) There is no pollution in New Jersey.
c) $2 + 1 = 3$.
d) The summer in Maine is hot and sunny.

Solution

(a) Mei does not have an MP3 player.
(b) There is pollution in New Jersey
(c) $2 + 1 \neq 3$
(d) The summer in Maine is not (hot and sunny).

10. Let p and q be the propositions

p: I bought a lottery ticket this week.
q: I won the million dollar jackpot.

Express each of these propositions as an English sentence.

a) $\neg p$ **b)** $p \vee q$ **c)** $p \rightarrow q$
d) $p \wedge q$ **e)** $p \leftrightarrow q$ **f)** $\neg p \rightarrow \neg q$
g) $\neg p \wedge \neg q$ **h)** $\neg p \vee (p \wedge q)$

Solution

(a) I did not buy a lottery ticket this week.
(b) I bought a lottery ticket this week or I won the million dollar jackpot.
(c) If I bought a lottery ticket this week, then I won the million dollar jackpot.
(d) I bought a lottery ticket this week and I won the million dollar jackpot.
(e) I bought a lottery ticket this week if and only if I won the million dollar jackpot.
(f) If I did not buy a lottery ticket this week, then I did not win the million dollar jackpot.
(g) I did not buy a lottery ticket this week and I did not win the million dollar jackpot.
(h) I did not buy a lottery ticket this week or, I bought a lottery ticket this week and won the million dollar jackpot.

15. Let p and q be the propositions

p: You drive over 65 miles per hour.

q: You get a speeding ticket.

Write these propositions using p and q and logical connectives (including negations).

a) You do not drive over 65 miles per hour.

b) You drive over 65 miles per hour, but you do not get a speeding ticket.

c) You will get a speeding ticket if you drive over 65 miles per hour.

d) If you do not drive over 65 miles per hour, then you will not get a speeding ticket.

e) Driving over 65 miles per hour is sufficient for getting a speeding ticket.

f) You get a speeding ticket, but you do not drive over 65 miles per hour.

g) Whenever you get a speeding ticket, you are driving over 65 miles per hour.

Solution

(a) $\neg p$

(b) $p \wedge \neg q$

(c) $p \rightarrow q$

(d) $\neg p \rightarrow \neg q$

(e) $p \rightarrow q$

(f) $q \wedge \neg p$

(g) $q \rightarrow p$

36. Construct a truth table for each of these compound propositions.

a) $p \oplus p$

f) $(p \oplus q) \wedge (p \oplus \neg q)$

d) $(p \rightarrow q) \wedge (\neg p \rightarrow q)$

Solution

a) $p \oplus p$

a)

P	P $\oplus$ P
T	F
F	F

Solution

f) $(p \oplus q) \wedge (p \oplus \neg q)$

f)

P	Q	~Q	(P ⊕ Q)	(P ⊕ ~Q)	(P ⊕ Q) ∧ (P ⊕ ~Q)
T	T	F	F	T	F
T	F	T	T	F	F
F	T	F	T	F	F
F	F	T	F	T	F

Solution

d) $(p \rightarrow q) \wedge (\neg p \rightarrow q)$

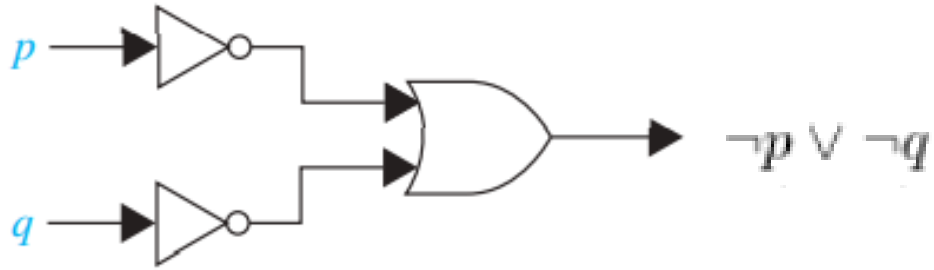
d)

P	Q	~P	(P ⇒ Q)	(~P ⇒ Q)	(P ⇒ Q) ∧ (~P ⇒ Q)
T	T	F	T	T	T
T	F	F	F	T	F
F	T	T	T	T	T
F	F	T	T	F	F

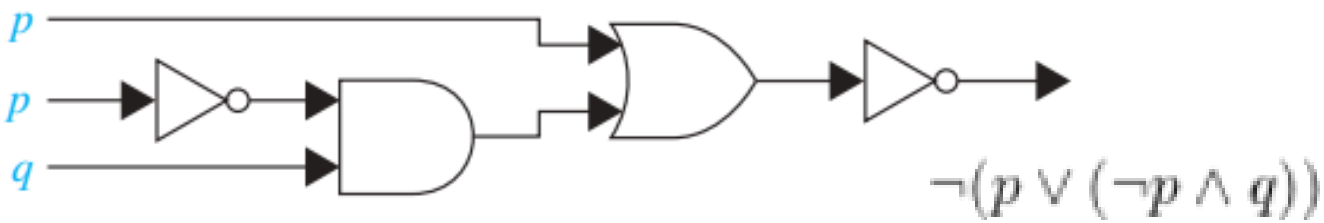
Solution

44. Find the output of each of these combinatorial circuits.

a)

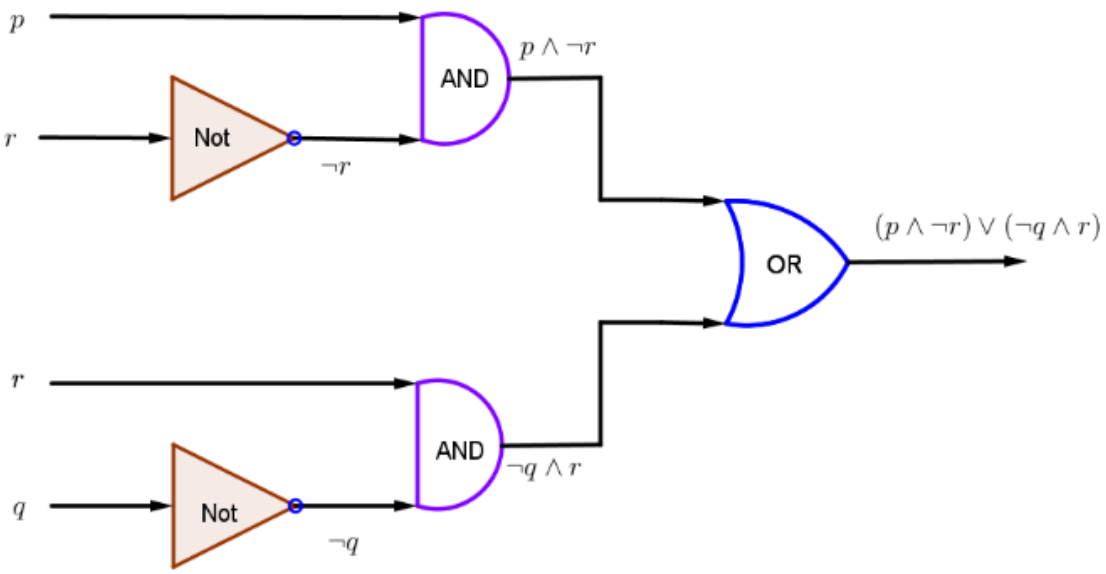


b)



46. Construct a combinatorial circuit using inverters, OR gates, and AND gates that produces the output $(p \wedge \neg r) \vee (\neg q \wedge r)$ from input bits p, q, and r.

Solution



Thank You