

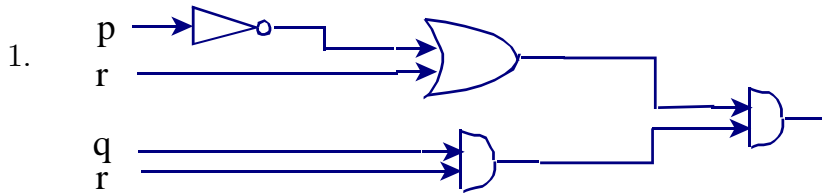
Logic Exercise Set #7 – Solutions

SUMMER 2017

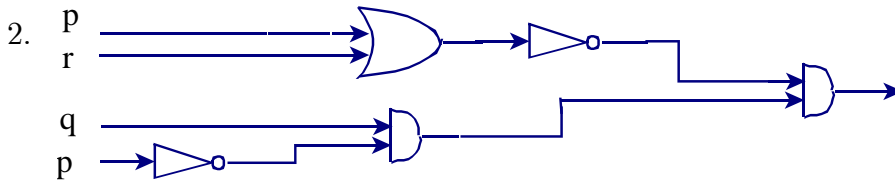
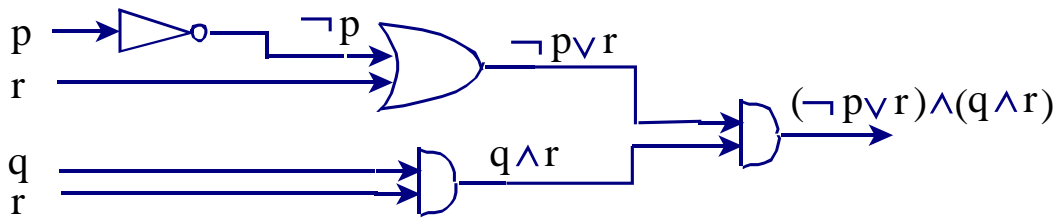
Pat Rossi

Name _____

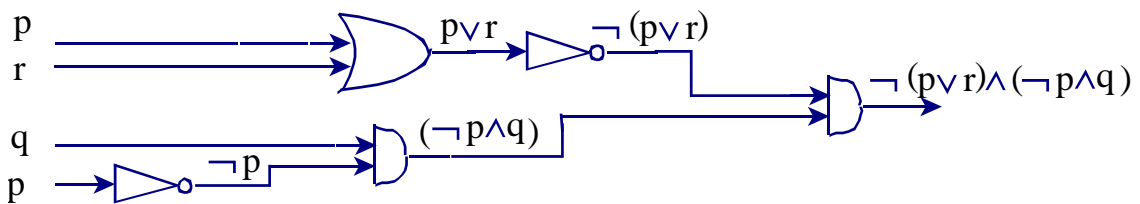
Instructions Exercises 1-2: Determine the output of the combinatorial circuits:



We follow the processing of the input step by step, yielding:

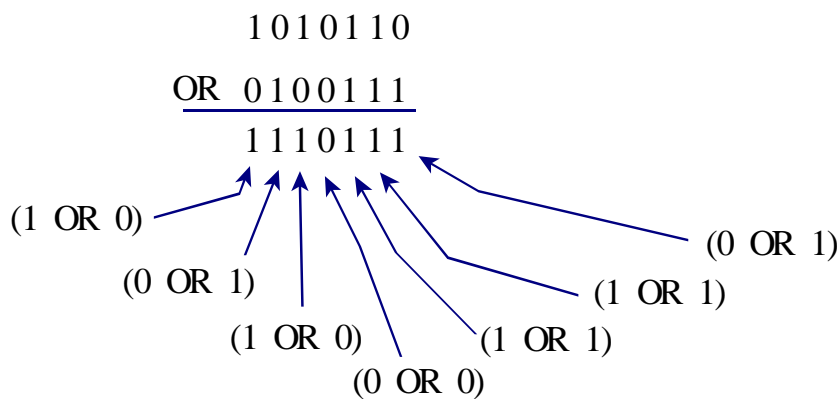


We follow the processing of the input step by step, yielding:

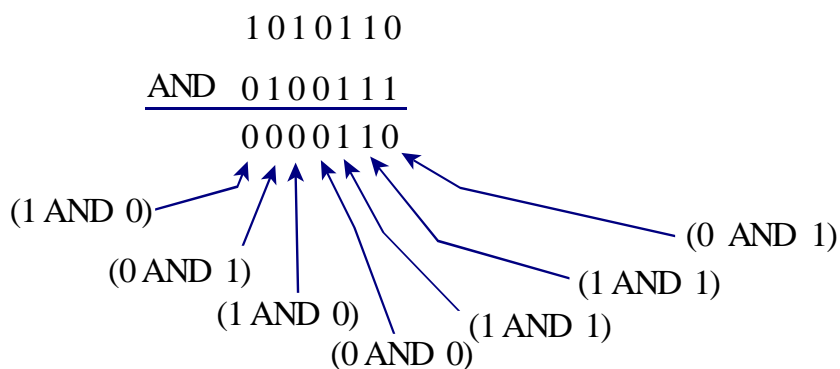


3. Find the bitwise OR, bitwise AND, and bitwise XOR of the pair of bit strings: 1010110 and 0100111

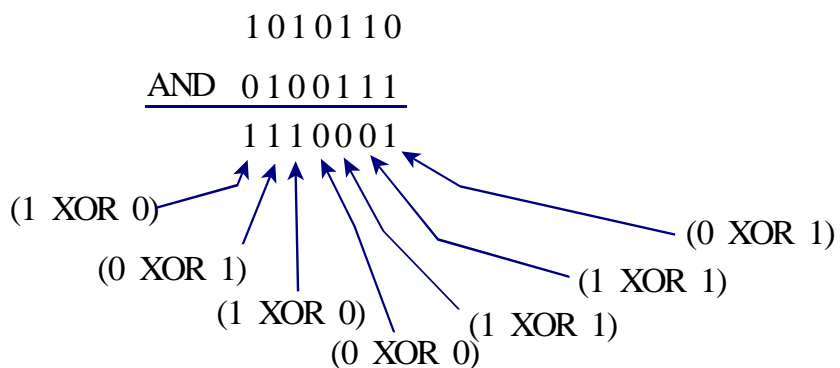
1010110 OR 0100111 \equiv 1110111 (The justification is given below)



1010110 AND 0100111 \equiv 0000110 (The justification is given below)



1010110 XOR 0100111 \equiv 1110001 (The justification is given below)



4. Determine if the System Specifications are consistent:

s_1 If the file system is not locked, then new messages will be queued.

s_2 If the file system is not locked, then the system is functioning normally, and conversely.

s_3 If new messages are not queued, then they will be sent to the message buffer.

s_4 If the file system is not locked, then new messages will be sent to the message buffer.

s_5 New messages will not be sent to the message buffer.

We represent the statements above symbolically, using the following assignments:

p: The file system is not locked

q: New messages will be queued

r: The system is functioning normally

s: New messages will be sent to the message buffer

Our System specifications are as follows

s_1 If the file system is not locked, then new messages will be queued. $p \rightarrow q$

s_2 If the file system is not locked, then the system is functioning normally, **and conversely**. $p \leftrightarrow r$

s_3 If new messages are not queued, then they will be sent to the message buffer. $\neg q \rightarrow s$

s_4 If the file system is not locked, then new messages will be sent to the message buffer. $p \rightarrow s$

s_5 New messages will not be sent to the message buffer. $\neg s$

The System Specifications will be consistent exactly when the conjunction of the specifications is not a contradiction.

p	q	r	s	$\neg q$	$s_1: p \rightarrow q$	$s_2: p \leftrightarrow r$	$s_3: \neg q \rightarrow s$	$s_4: p \rightarrow s$	$s_5: \neg s$	$s_1 \wedge s_2 \wedge s_3 \wedge s_4 \wedge s_5$
T	T	T	T	F	T	T	T	T	F	F
T	T	T	F	F	T	T	T	F	T	F
T	T	F	T	F	T	F	T	T	F	F
T	T	F	F	F	T	F	T	F	T	F
T	F	T	T	T	F	T	T	T	F	F
T	F	T	F	T	F	T	F	F	T	F
T	F	F	T	T	F	F	T	T	F	F
T	F	F	F	T	F	F	F	F	T	T
F	T	T	T	F	T	F	T	T	F	F
F	T	T	F	F	T	F	T	T	T	F
F	T	F	T	F	T	T	T	T	F	F
F	T	F	F	F	T	T	T	T	T	T
F	F	T	T	T	T	F	T	T	F	F
F	F	T	F	T	T	F	F	T	T	F
F	F	F	T	T	T	T	T	T	F	F
F	F	F	F	T	T	T	F	T	T	F

The single “T” in the right most column, prevents the conjunction of the system specifications from being a contradiction.

The set of system specifications IS consistent.