

Homework: Logic Gates

Name: _____

Draw a circuit that represents the logical statements.

- $p \mid (!q \ \& \ !p)$
- $x \ \& \ ![y \mid (x \ \& \ z)]$
- $p \mid ![q \ \& \ !(q \mid !p)]$
- $x \mid (y \ \& \ z \ \& \ !x) \ \& \ !z$
- $(!p \ \& \ q \ \& \ !r) \mid (p \ \& \ q \ \& \ r) \mid (p \ \& \ !q \ \& \ r) \mid (!p \ \& \ !q \ \& \ !r)$

Write a logic statement and draw a circuit that represents the truth tables.

6.

p	q	Output
T	T	F
T	F	T
F	T	T
F	F	T

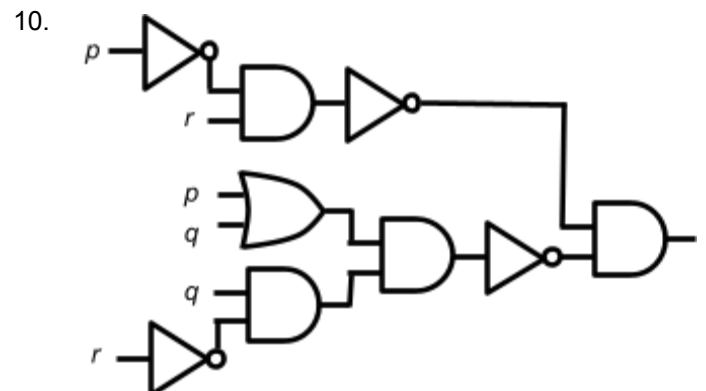
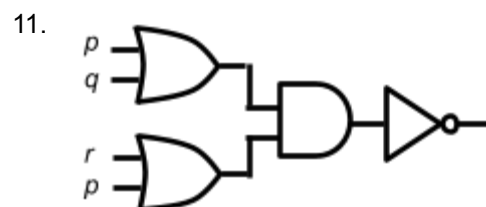
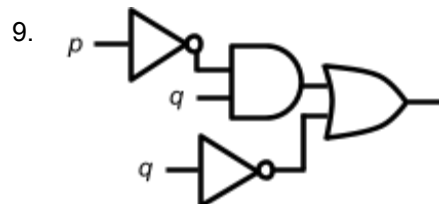
7.

p	q	r	Output
T	T	T	T
T	T	F	F
T	F	T	T
T	F	F	F
F	T	T	F
F	T	F	T
F	F	T	F
F	F	F	F

8.

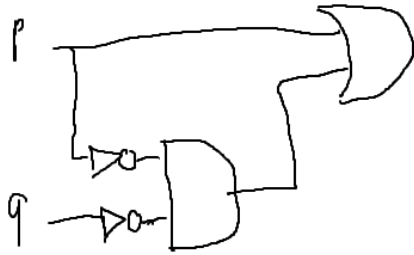
p	q	r	s	Output
T	T	T	T	F
T	T	T	F	F
T	T	F	T	T
T	T	F	F	F
T	F	T	T	F
T	F	T	F	T
T	F	F	T	F
T	F	F	F	F
F	T	T	T	T
F	T	T	F	F
F	T	F	T	F
F	T	F	F	F
F	F	T	T	F
F	F	T	F	F
F	F	F	T	F
F	F	F	F	T

Write a logical expression that is represented by the circuit.

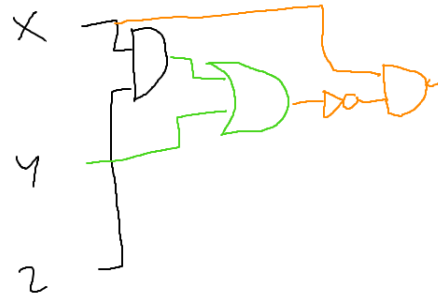


Homework: Logic Gates Solutions

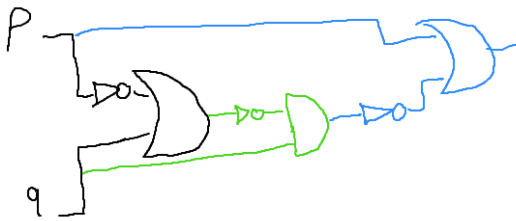
1.



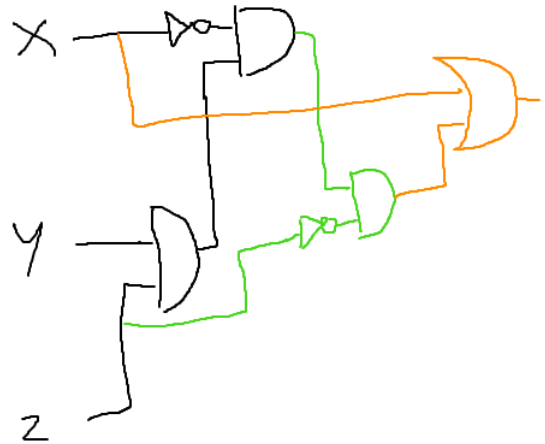
2.



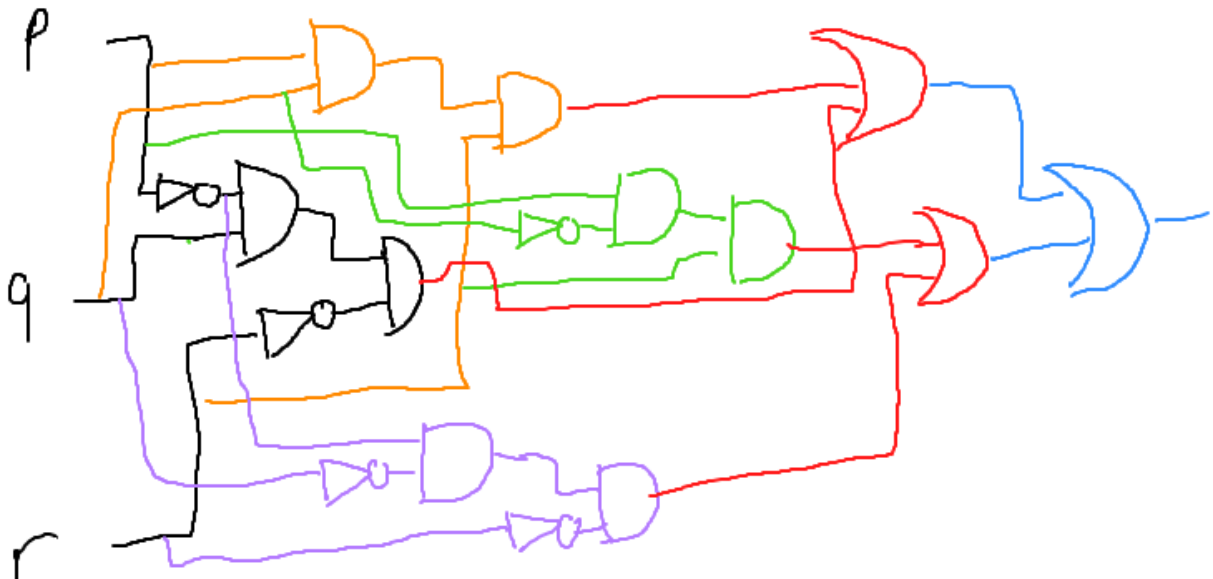
3.



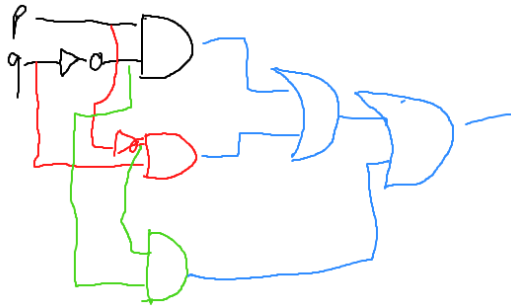
4. (OR statements have the lowest priority in the order of operations)



5. Can also be simplified to $(p \wedge r) \vee \sim(p \vee r) \wedge (q \vee \sim q)$

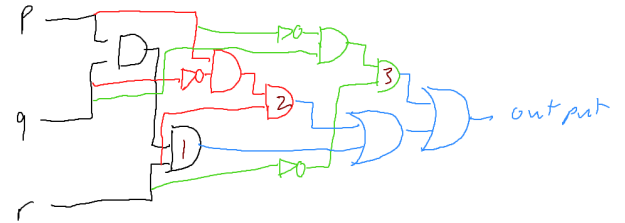


6. $(p \& !q) \mid (!p \& q) \mid (!p \& !q) \text{ OR } \sim(p \wedge q)$



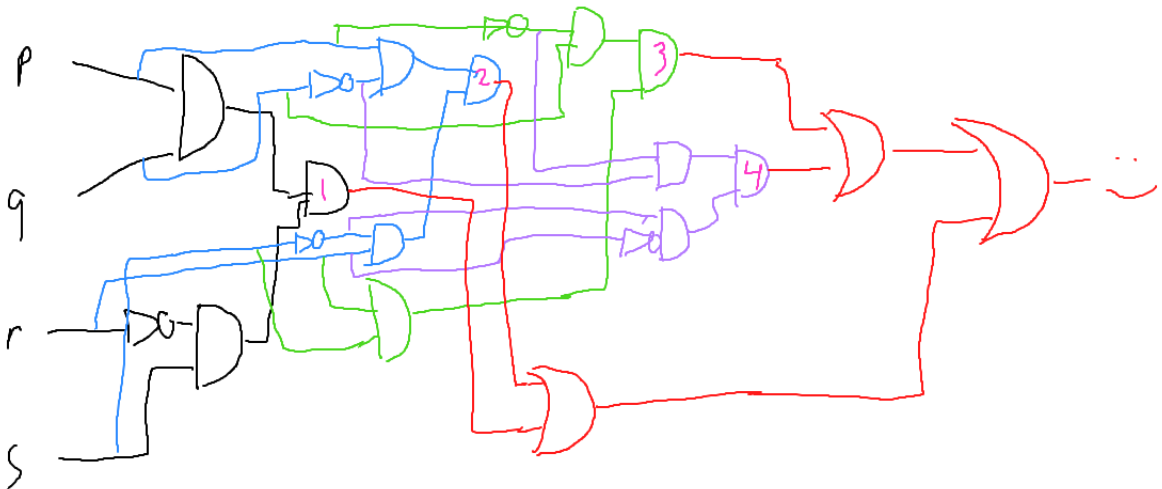
7. $(p \wedge q \wedge r) \mid (p \wedge !q \wedge r) \mid (!p \wedge q \wedge !r)$

7.



8. $(p \wedge q \wedge !r \wedge s) \mid (p \wedge !q \wedge r \wedge !s) \mid$
 $(!p \wedge q \wedge r \wedge s) \mid (!p \wedge !q \wedge !r \wedge !s)$

8.



9. $!q \mid (!p \& q)$

10. $!(p \& r) \& !((p \mid q) \& (!r \& q))$

11. $!((p \mid q) \& (r \mid p))$