

Homework: Logic Gates

Name: _____

Draw a circuit that represents the logical statements.

1. $p \mid (\neg q \& \neg p)$
2. $x \& \neg[y \mid (x \& z)]$
3. $p \mid \neg[q \& \neg(q \mid \neg p)]$
4. $x \mid (y \& z \& \neg x) \& \neg z$
5. $(\neg p \& q \& \neg r) \mid (p \& q \& r) \mid (p \& \neg q \& r) \mid (\neg p \& \neg q \& \neg r)$

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

8.

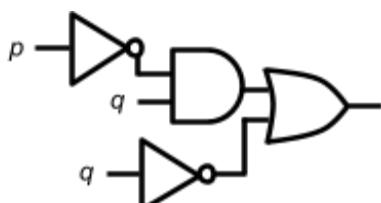
p	q	r	s	Output
T	T	T	T	F
T	T	T	F	F
T	T	F	T	T
T	T	F	F	F
T	F	T	T	F
T	F	T	F	T
T	F	F	T	F
T	F	F	F	F
F	T	T	T	T
F	T	T	F	F
F	T	F	T	F
F	T	F	F	F
F	F	T	T	F
F	F	T	F	F
F	F	F	T	F
F	F	F	F	T

7.

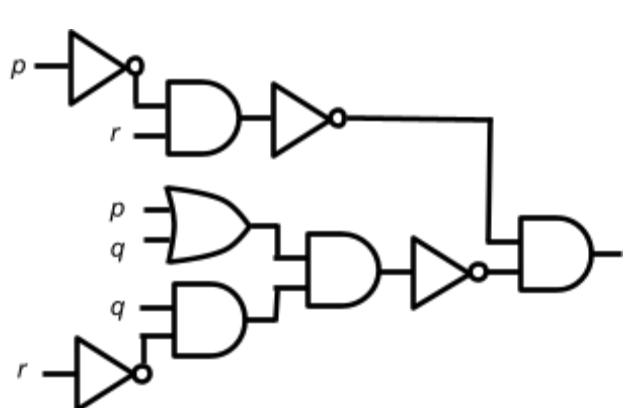
p	q	r	Output
T	T	T	T
T	T	F	F
T	F	T	T
T	F	F	F
F	T	T	F
F	T	F	T
F	F	T	F
F	F	F	F

Write a logical expression that is represented by the circuit.

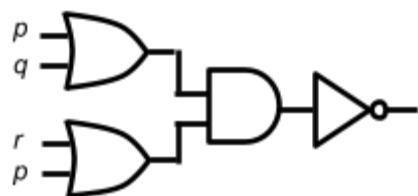
9.



10.

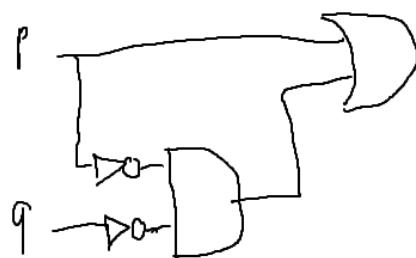


11.

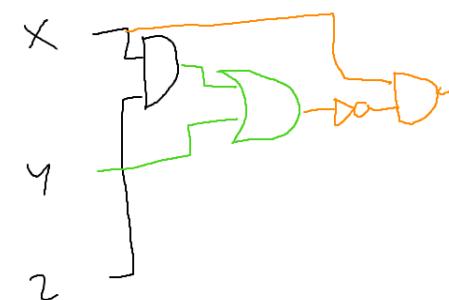


Homework: Logic Gates Solutions

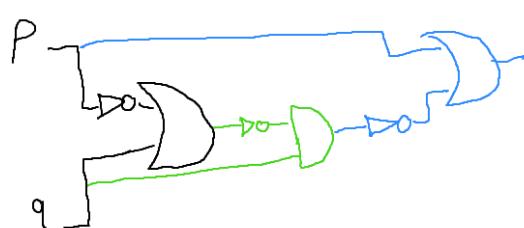
1.



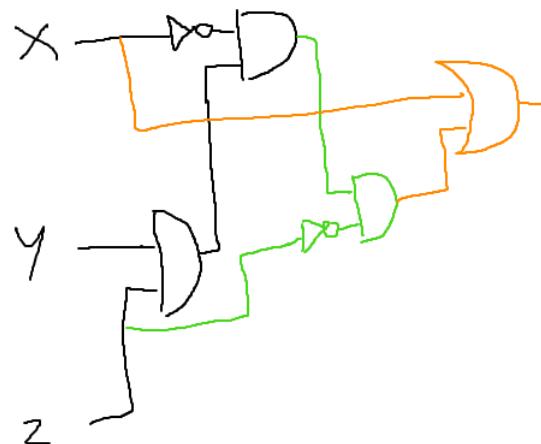
2.



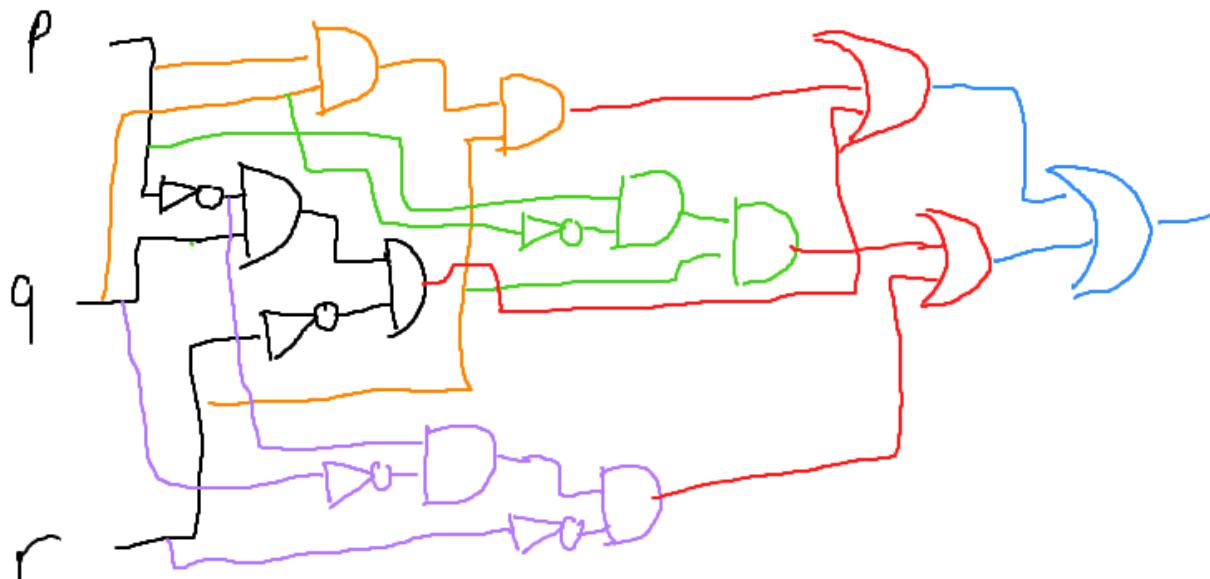
3.



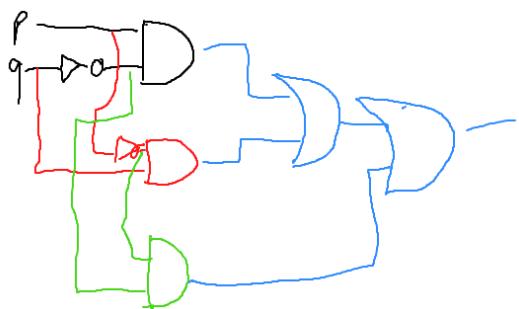
4. (OR statements have the lowest priority in the order of operations)



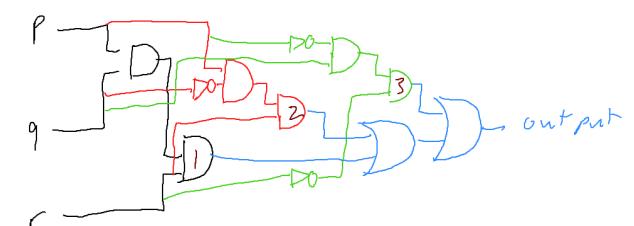
5. Can also be simplified to $(p \wedge r) \vee \neg(p \vee r) \wedge (\neg q \vee \neg q)$



$$6. \quad (p \wedge \neg q) \mid (\neg p \wedge q) \mid (\neg p \wedge \neg q) \text{ OR } \neg(p \wedge q)$$

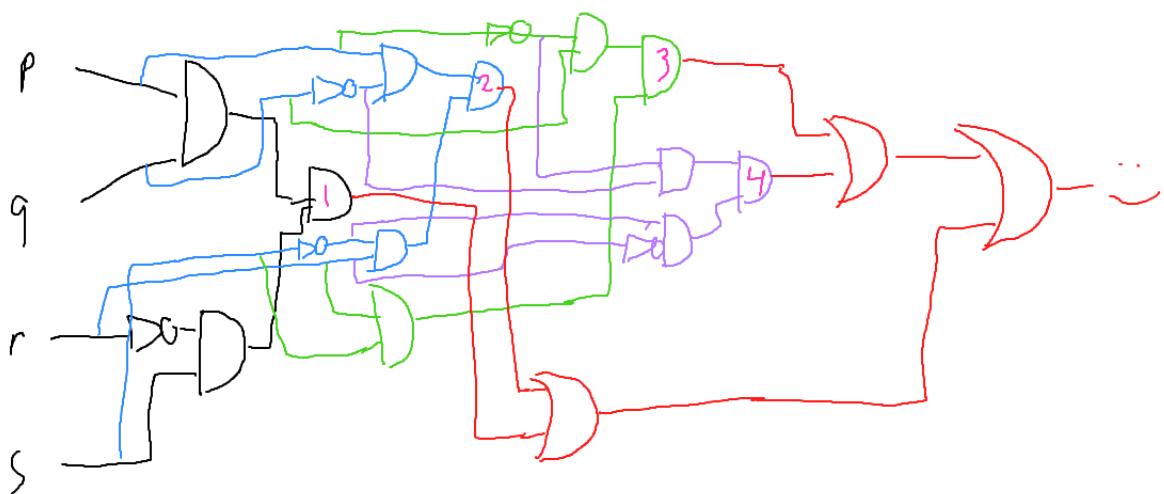


$$7. \quad \underline{(\rho \wedge q \wedge r)} \mid \underline{(\rho \wedge \neg q \wedge \neg r)} \mid (\neg \rho \wedge q \wedge \neg r)$$



$$\frac{(p \wedge q \wedge \neg r \wedge s) \mid (p \wedge \neg q \wedge r \wedge \neg s)}{(\neg p \wedge q \wedge r \wedge s) \mid (\neg p \wedge \neg q \wedge \neg r \wedge \neg s)}$$

8.



$$9. \neg q \mid (\neg p \wedge q)$$

$$10. \neg(\neg p \wedge r) \wedge \neg((p \mid q) \wedge (\neg r \wedge q))$$

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