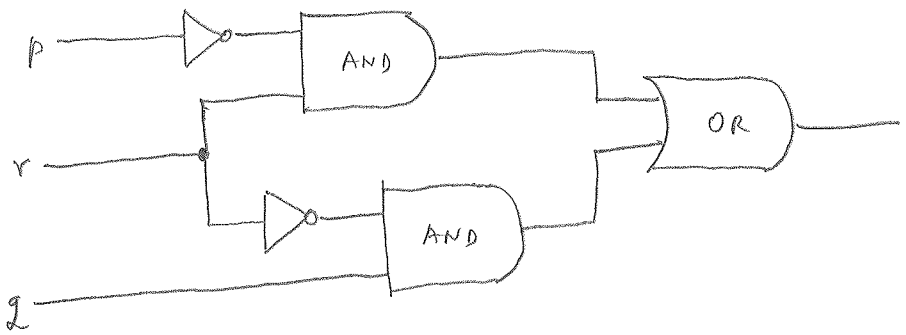
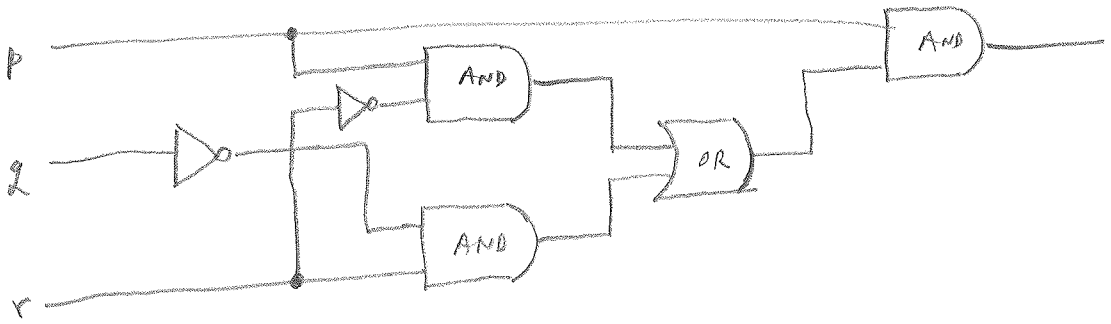
CW1 SOLUTIONS

① (a)



(b)



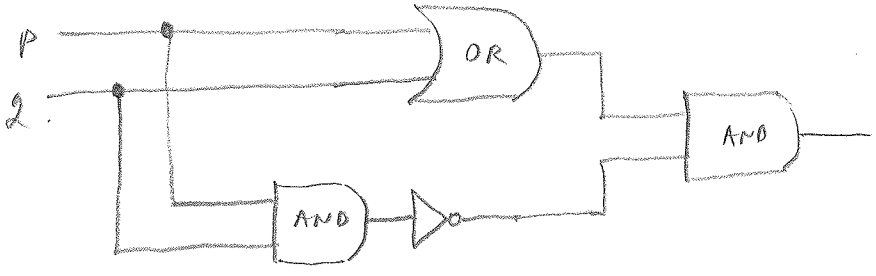
② (a) $pq \vee p'r'$

(b)

p	q	r	$(p \wedge q)$	$\vee$	$(\neg p \wedge \neg r)$
1	1	1	1	1	0 0 0
1	1	0	1	1	0 0 1
1	0	1	0	0	0 0 0
1	0	0	0	0	0 0 1
0	1	1	0	0	1 0 0
0	1	0	0	1	1 1 1
0	0	1	0	0	1 0 0
0	0	0	0	1	1 1 1

⇑

③ By De'Morgan's law, $(p \vee q) \wedge (p' \vee q') \equiv (p \vee q) \wedge \left((p \wedge q)'\right)$, so the required circuit is:



④ (a)

p	q	$\neg(p \vee q)$	$\neg p \wedge \neg q$
1	1	0	0 0
1	0	0	0 0
0	1	0	1 0
0	0	1	1 1

the truth tables associated with Boolean formulae $(p \vee q)'$ and $p'q'$ are the same so they are EQUIVALENT,

$$(p \vee q)' \equiv p'q'$$

(b)

p	q	$p \vee (p \wedge q)$
1	1	1 1 1
1	0	1 1 0
0	1	0 0 0
0	0	0 0 0

EQUAL, so $p \equiv p \vee pq$

⑤ (a) $pqr \vee pqr' \vee p'qr \vee p'q'r'$

(b) $pq'r \vee pq'r' \vee p'q'r \vee p'q'r'$