(1)

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

Identical

$(p \vee (p \oplus q)) \wedge q \iff q$

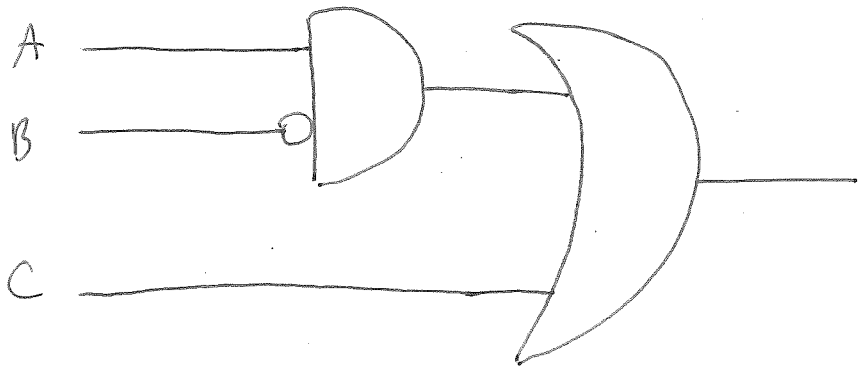
(2)

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

Identical

Yes

(3)



$A\bar{B} + C$

(4) a) $r \wedge (\sim p \vee q) \iff (r \wedge \sim p) \vee (r \wedge q)$ Distributive

b) $AB(\bar{A}B + C) = ABC$ Absorption

c) $\overline{\bar{C}D} = \bar{\bar{C}} + \bar{D}$ De Morgan's

(5) $\sim((p \vee \sim q) \wedge \sim p)$

$\iff \sim(p \vee \sim q) \vee \sim(\sim p)$ De Morgan's

$\iff \sim p \wedge \sim(\sim q) \vee \sim(\sim p)$ De Morgan's

$\iff \sim p \wedge q \vee p$ Complement (twice)

$\iff p \vee (\sim p \wedge q)$ Commutative

$\iff p$ Absorption

(6) If $\underbrace{x \text{ equals } 3}_{p}$ then $\underbrace{y \text{ does not equal } 7}_{q}$.

a) The inverse is $\sim p \to \sim q$
If x does not equal 3 then y equals 7.
NOT logically equivalent to $p \to q$.

b) The converse is $q \to p$
If y does not equal 7 then x equals 3.
NOT logically equivalent to $p \to q$.

c) The contrapositive is $\sim q \to \sim p$
If y equals 7 then x does not equal 3.
This IS logically equivalent to $p \to q$.

(7) a) No

b) YES

c) YES

d) No