Solutions (Truth Tables)

1.) 16 rows, 5 columns
(4 atoms $\rightarrow 2^4$ rows)
$(\neg q, \neg s, p \vee \neg q, (p \vee \neg q) \rightarrow r, ((p \vee \neg q) \rightarrow r) \wedge \neg$

2)

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

It is a contingency. because it can be both true and false, depending on the truth values of the atoms

3)

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

It is a contingency because it can be both true and false depending on the truth values of the atoms.

4) Given,

$p \rightarrow T, (1)$

$q \rightarrow T, (1)$

$r \rightarrow F, (0)$

$s \rightarrow F, (0)$

$\therefore \neg((0 \vee 1) \wedge (\neg(0) \vee \neg(1)))$

$= \neg((1) \wedge (1 \vee 0))$

$= \neg(1 \wedge 1)$

$= \neg(1) = 0$

$\therefore$ The truth value is False.

5)

a	b	c	$\neg a$	$(\neg a \vee b)$	$((\neg a \vee b) \wedge c)$	$(((\neg a \vee b) \wedge c) \leftrightarrow b)$	$((((\neg a \vee b) \wedge c) \leftrightarrow b) \rightarrow a$
0	0	0	1	1	0	1	0
0	0	1	1	1	1	0	1
0	1	0	1	1	0	0	1
0	1	1	1	1	1	1	0
1	0	0	0	0	0	1	1
1	0	1	0	0	0	1	1
1	1	0	0	1	0	0	1
1	1	1	0	1	1	1	1

6)

a	b	$\neg a$	$(\neg a \to \top)$	$(\bot \vee b)$	$(\neg a \to \top) \leftrightarrow (\bot \vee b)$
0	0	1	1	0	0
0	1	1	1	1	1
1	0	0	1	0	0
1	1	0	1	1	1

It is a contingency, because it can be both true and false depending on the truth values of the atoms.

7)

a	b	$\neg b$	$(a \leftrightarrow \bot)$	$(\top \leftrightarrow \neg b)$	$(a \leftrightarrow \bot) \wedge (\top \leftrightarrow \neg b)$
0	0	1	1	1	1
0	1	0	1	0	0
1	0	1	0	1	0
1	1	0	0	0	0

It is a contingency because it can be both true and false depending on the truth values of the atoms

8)

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

It is a tautology.

g)

p	q	$\neg p$	$(\neg p \to q)$	$(p \vee q)$	$((\neg p \to q) \leftrightarrow (p \vee q))$	$\neg((\neg p \to q) \leftrightarrow (p \vee q))$
0	0	1	0	0	1	0
0	1	1	1	1	1	0
1	0	0	1	1	1	0
1	1	0	1	1	1	0

It is a contradiction