HOMEWORK SESSION 2

Nguyễn Tiến Đức - ITITIU18029

4.

p: I bought a lottery ticket this week.

q: I won the million dollar jackpot on Friday.

a) It is not the case that I bought a lottery ticket this week.

b) Either I bought a lottery ticket this week or I won the million dollar jackpot on Friday.

c) If I bought a lottery ticket this week, then I won the million dollar jackpot on Friday.

d) I bought a lottery ticket this week and won the million dollar jackpot on Friday.

e) I won the million dollar jackpot on Friday if and only if I bought a lottery ticket this week.

f) If I did not buy a lottery ticket this week, then I did not win the million dollar jackpot on Friday.

g) I did not buy a lottery ticket this week and did not win the million dollar jackpot on Friday.

h) It is either that I did not buy a lottery ticket this week or I bought a lottery ticket this week and won the million dollar jackpot on Friday.

8.

p: You have the flu.

q: You miss the final examination.

r: You pass the course.

a) If you have the flu, then you miss the final examination.

b) You pass the course if and only if you do not miss the final examination.

c) If you miss the final examination, then you do not pass the course.

d) Either you have the flu or you miss the final examination or you pass the course.

e) Either that if you have the flu, then you do not pass the course or if you miss the final examination, then you do not pass the course.

f) Either you have flu and miss the final examination, or you do not miss the final examination and pass the course.

10.

p: You get A on the final exam.

q: You do every exercise in this book.

r: You get an A in this class.

a) $\neg q \wedge r$

b) $p \wedge q \wedge r$

c) $r \rightarrow p$

d) $p \wedge \neg q \wedge r$

e) $(p \wedge q) \rightarrow r$

f) $(p \vee q) \leftrightarrow r$

14.

a) TRUE (F→F): "$1 + 1 = 3$" is false and "unicorns exist" is false.

b) TRUE (F→F): "$1 + 1 = 3$" is false and "dogs can fly" is false.

c) FALSE (T→F): "$1 + 1 = 2$" is true and "dogs can fly" is false.

d) TRUE (T→T): "$2 + 2 = 4$" is true and "$1 + 2 = 3$" is true.

16.

a) Inclusive or: The employer will not lose anything if the applicant knows both C++ and Java and may even benefit from that. Anyway, the applicant still qualify for what the employer need (either C++ or Java).

b) Exclusive or: The statement is intended to announce that lunch will include either soup or salad. To serve both dishes, the chef requires double the amount of resources and the one who eat have to pay twice the price. Therefore, if the inclusive meaning is intended, it would be stated differently to avoid ambiguity.

c) Inclusive or: You need at least one in two. If you have both, you are qualified for entry in both ways and no one can deny your entry.

d) Exclusive or: A researcher must do research and publish new articles in order to stay competitive, otherwise, he will fall behind others and his caeer will perish. The statement is intended to encourage reseachers, thus, it cannot have the inclusive meaning that even if you publish, your career will still perish.

26.

a) 2 variables p, q: $2^2 = 4$ rows

b) 3 variables p, t, s: $2^3 = 8$ rows

c) 6 variables p, r, s, t, u, v: $2^6 = 64$ rows

d) 5 variables p, r, s, q, t: $2^5 = 32$ rows

28.

(1 is true, 0 is false)

a) $p \to \neg p$

p	$\neg p$	$p \to \neg p$
0	1	1
1	0	0

b) $p \leftrightarrow \neg p$

p	$\neg p$	$p \leftrightarrow \neg p$
0	1	0
1	0	0

c) $p \oplus (p \vee q)$

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

d) $(p \wedge q) \to (p \vee q)$

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

e) $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$

p	q	$\neg p$	$q \rightarrow \neg p$	$p \leftrightarrow q$	$(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$
0	0	1	1	1	1
0	1	1	1	0	0
1	0	0	1	0	0
1	1	0	0	1	0

f) $(p \leftrightarrow q) \oplus (p \leftrightarrow \neg q)$

p	q	$p \leftrightarrow q$	$\neg q$	$p \leftrightarrow \neg q$	$(p \leftrightarrow q) \oplus (p \leftrightarrow \neg q)$
0	0	1	1	0	1
0	1	0	0	1	1
1	0	0	1	1	1
1	1	1	0	0	1

30.

(1 is true, 0 is false)

a) $p \oplus p$

p	p	$p \oplus p$
0	0	0
1	1	0

b) $p \oplus \neg p$

p	$\neg p$	$p \oplus \neg p$
0	1	1
1	0	1

c) $p \oplus \neg q$

p	q	$\neg q$	$p \oplus \neg q$
0	0	1	1
0	1	0	0
1	0	1	0
1	1	0	1

d) $\neg p \oplus \neg q$

p	q	$\neg p$	$\neg q$	$\neg p \oplus \neg q$
0	0	1	1	0
0	1	1	0	1
1	0	0	1	1
1	1	0	0	0

e) $(p \oplus q) \vee (p \oplus \neg q)$

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

f) $(p \oplus q) \wedge (p \oplus \neg q)$

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

38.

a) $11000 \wedge (01011 \vee 11011) = 11000 \wedge 11011 = 11000$

b) $(01111 \wedge 10101) \vee 01000 = 00101 \vee 01000 = 01101$

c) $(01010 \oplus 11011) \oplus 01000 = 10001 \oplus 01000 = 11001$

d) $(11011 \vee 01010) \wedge (10001 \vee 11011) = 11011 \wedge 11011 = 11011$