Logic

1 Propositional logic and the meaning of 'or'

Let $\vee$ be the standard inclusive *or* and $+$ be the exclusive one, and let $\wedge$ be *and*, with the truth tables in (1).

(1)

p	q	$p \vee q$	$p + q$	$p \wedge q$
1	1	1	0	1
1	0	1	1	0
0	1	1	1	0
0	0	0	0	0

If *or* in natural language is ambiguous between an inclusive and exclusive interpretation, then a sentence like (2a), expressed more idomatically as in (2b), would actually have the four different translations into propositional logic given in (3).

(2) a. Kim smokes or drinks, or Kim smokes and drinks.
     b. Kim smokes or drinks, or both.

(3) $s = Kim\ smokes,\ d = Kim\ drinks$

     a. $(s \vee d) \vee (s \wedge d)$
     b. $(s + d) \vee (s \wedge d)$
     c. $(s + d) + (s \wedge d)$
     d. $(s \vee d) + (s \wedge d)$

Consider now (4a) and (4b):

(4) a. $s \vee d$
     b. $s + d$

Use truth tables to prove that (3a)-(3c) are logically equivalent to (4a) and that (3d) is logically equivalent to (4b). What does this result lead us to conclude about the hypothesis that English *or* is ambiguous between an inclusive and an exculsive interpretation?

BE CAREFUL WHEN ANSWERING THIS QUESTION!!! In particular, think about the relation between your initial assumption that English *or* is ambiguous and what your formal analysis of the truth conditions of (2a) claims about the meaning of this sentence.

2 Translating English sentences into predicate logic

Do exercise G from chapter 2 of Kearns (p. 50).

3 Adding quantifiers

Do exercise I from chapter 2 of Kearns (p. 50).