

Section 1.5: cont'd

Tuesday, September 30, 2014
2:30 PM

problem: in English, the word "or" can mean either the "inclusive or" ("or both") or the "exclusive or" ("but not both") and we tell the difference by context

example: which "or" inclusive or exclusive, is meant in the following sentences?

- ① Wanted: Dead or Alive! Exclusive
- ② Would you like milk or sugar in your tea? Inclusive
- ③ I want to get an A or a B in Pat's Math class. Exclusive

example:

Let p = "Pat drank tea" and q = "Pat drank coffee."

Translate the following into logical symbols.

- ① Pat drank tea or coffee. $p \vee q$
 - ② Pat drank tea or she didn't. $p \vee \bar{p}$
 - ③ Pat drank tea and not coffee. $p \oplus \bar{p}$
- } either

③ I've drunk tea and not coffee.

$$p \oplus \bar{p}$$

$$p \wedge \bar{q}$$

④ It's not true that I've drunk tea and coffee.

$$\overline{p \wedge q}$$

note: $\bar{p} \wedge \bar{q}$ is not equivalent to $\overline{p \wedge q}$

note: if you have a nasty expression like

$$\overline{\bar{p} \vee \bar{q}} \wedge \bar{p}$$

, we will be learning how to simplify it

logical reasoning:

example: Answer the questions based on the given information.

① True: I drank tea or coffee today.

one or the other or both

True: I drank coffee today.

Question: Did I drink tea today?

② True: I drank tea or coffee today.

one or other or both

Maybe.

True: I did not drink coffee today.

Question: Did I drink tea today?

Yes

③ True: I drank tea or coffee today but
not both.
True: I drank coffee today.

Question: Did I drink tea today?

No

④ True: I drank tea today.

Question: Did I drink tea or coffee? Yes

Question: Did I drink tea and coffee? Maybe

⑤ True: I drank tea and coffee today.

Question: Did I drink tea? Yes