

# PHILOSOPHY 210

## NATURAL DEDUCTIVE LOGIC

FALL SEMESTER, 2000

### PROBLEMS

#### PROPOSITIONAL LOGIC

1. Let  $P$  be the proposition "It is raining" and  $Q$  be the proposition "The ground is wet".

Write the following statements in propositional logic using  $P$  and  $Q$  and logical connectives.

(a) It is raining and the ground is wet.  $P \wedge Q$

(b) It is raining but the ground is not wet.  $P \wedge \neg Q$

(c) If it is raining then the ground is wet.  $P \rightarrow Q$

(d) It is not raining and the ground is not wet.  $\neg P \wedge \neg Q$

(e) It is raining or the ground is wet.  $P \vee Q$

(f) If it is not raining then the ground is not wet.  $\neg P \rightarrow \neg Q$

(g) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(h) It is raining if and only if the ground is wet.  $P \leftrightarrow Q$

(i) It is not raining and the ground is wet.  $\neg P \wedge Q$

(j) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(k) It is raining and the ground is wet, or it is not raining and the ground is not wet.  $(P \wedge Q) \vee (\neg P \wedge \neg Q)$

(l) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(m) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(n) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(o) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(p) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(q) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(r) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

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(v) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(w) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(x) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(y) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(z) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(aa) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(ab) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(ac) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

(ad) It is raining and the ground is not wet, or it is not raining and the ground is not wet.  $(P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

(ae) It is raining and the ground is not wet, or it is not raining and the ground is wet.  $(P \wedge \neg Q) \vee (\neg P \wedge Q)$

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