

Math 206 — Introduction to statements

Problem 1. Each of the following English sentences is an implication $P \implies Q$. Identify the antecedent P and the conclusion Q .

- a. If it is raining, I will stay home.
- b. I wake up if the baby cries.
- c. I wake up only if the fire alarm goes off.
- d. If x is odd, then x is prime.
- e. The number x is prime only if x is odd.
- f. You can come to the part only if you have an invitation.
- g. Whenever the bell rings, I leave the house.

Problem 2. Make the truth table for the statements $\neg(P \wedge Q)$ and $\neg P \vee \neg Q$. What can you conclude?

Problem 3. Write the following statements symbolically using P, Q, \wedge, \vee, \neg . Make sure to start by defining P and Q which will be used for both statements. Are they equivalent?

- a. Alice and Bob are not both in the room.
- b. Alice and Bob are both not in the room.

Problem 4. The biconditional $P \iff Q$ is defined to be $(P \implies Q) \wedge (Q \implies P)$. Make a truth table for $(P \implies Q) \wedge (Q \implies P)$.