

A Bit of Logic (Appendix A)

The implication or conditional:

$$(P \implies Q) \quad (\text{if } P, \text{ then } Q) \quad (P \text{ implies } Q)$$

The implication is logically equivalent to its contrapositive:

$$(\text{not } Q) \implies (\text{not } P)$$

The converse of  $P \implies Q$  is  $Q \implies P$ .

The double implication or biconditional:

$$(P \iff Q) \quad (P \text{ if and only if } Q) \quad (P \text{ iff } Q)$$

$P \iff Q$  is true when  $P$  and  $Q$  are either both true or both false.

Proof by Contradiction:

If  $C$  is a contradiction (a statement that is always false, e.g.,  $1=0$ ), then

$$P \implies Q \text{ and } [P \text{ and } (\text{not } Q)] \implies C$$

are logically equivalent.