“if P is true, then Q is true”

"if Q is false, then P is false"

“if P is true, then Q is true”

"if P is false, then Q is true"

indirect proofs

indirect proofs

- Proof by contrapositive

to prove the statement
"if P is true, then Q is true"
you instead prove the equivalent statement
"if Q is false, then P is false"

- Proof by contradiction

to prove the statement
"if P is true, then Q is true"
and show that the following is not possible
"if P is false, then Q is true"

- Proof by counterexample (not technically a proof)

indirect proofs: proof by contrapositive

Theorem

For any $n \in \mathbb{Z}$ n, if n^2 is even, then n is even.

Proof.