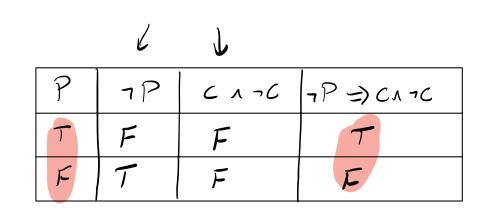
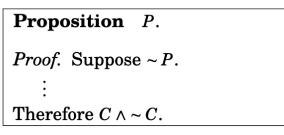
$$P \equiv (\neg P \Rightarrow (C \land \neg C))$$



Outline for Proof by Contradiction



Classic Example:
Proposition:
$$\sqrt{2}$$
 is invational.
Proof: Suppose $\sqrt{2}$ is rational.
Then, $\sqrt{2} = \frac{a}{b}$ for some integers a, b .
Suppose that $\frac{a}{b}$ is in fully adved Farm.
This means a and b are not both even.
So $2 = \frac{a^2}{b^2}$, and $a^2 = 2b^2$.
This implies that a^2 is even, so a is even.
Let $a = 2c$ for some c .
 $a^2 = 2b^2$
 $(2c)^2 = 2b^2$
 $4c^2 = 2b^2$
 $2c^2 = 5^2$. This implies that b^2 is even, thus
b is even, controd it ing the fact that a and
b are not both even.

Proving Carditional Statements by Cartadiction.
Proposition:
$$P \Rightarrow Q$$

Suppose $\neg (P \Rightarrow Q)$
Suppose $P \land \neg Q$.

Outline for Proving a Conditional Statement with Contradiction

Proposition	If P , then Q .
<i>Proof.</i> Suppose P and $\sim Q$.	
:	
Therefore $C \land \gamma$	~ <i>C</i> . ■

Proposition: If a, b & I and a 22, then a lb or a lb+1.

Ext | Proof:
Suppose n is obd and n² is even.
Let n: 2ax1. So
$$n^2 = (2a+1)^2 = 4a^2 + 4a + 1 = 2(2a^2+2a) + 1$$
.
This shews n^2 is odd, a contradiction.