

# Conditional Statements and Circuits



Recall the following line from field of dreams

"If you build it, they will come"

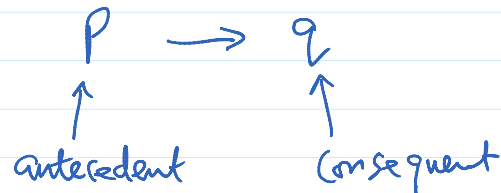
Conditional Statement

$$P \rightarrow Q$$

(P implies Q)

$\left\{ \begin{array}{l} \text{If } P, \text{ then } Q \\ \text{If } P, Q \end{array} \right.$

P	Q	$P \rightarrow Q$
T	T	T
T	F	F
F	T	T
F	F	T



1. If the antecedent is false, then  $P \rightarrow Q$  is true
2. If the Consequent is True, then  $P \rightarrow Q$  is true
3.  $P \rightarrow Q$  is false only when antecedent is true and consequent is false

Construct truth table

①  $(P \wedge Q) \rightarrow (P \vee Q)$

P	Q	$(P \wedge Q)$	$(P \vee Q)$	$(P \wedge Q) \rightarrow (P \vee Q)$
T	T	T	T	T
T	F	F	T	T
F	T	F	T	T
F	F	F	F	T

Tautology

T	F	F	T	T
F	T	F	T	T
F	F	F	F	T

Tautology

②  $(\sim p \rightarrow \sim q) \rightarrow (p \wedge q)$

p	q	$\sim p$	$\sim q$	$\sim p \rightarrow \sim q$	$p \wedge q$	$(\sim p \rightarrow \sim q) \rightarrow (p \wedge q)$
T	T	F	F	T	T	T
T	F	F	T	T	F	F
F	T	T	F	F	F	T
F	F	T	T	T	F	F