

Math 321

Discrete

Math = tags + rules

→ declarative sentence that true or false, but not both.

Rules? Represent propositions: declarative sentence that is T or F, but not both

P, Q, R, \dots \Leftarrow propositional variables

(ex) bear : "I saw a bear outside Jabara Hall"
 \Leftarrow denotes

(ex) P is a prop. variable

P
$\neg P$

P, Q
T, T
T, F
F, T
F, F

P	Q	\neg
T	T	\neg
T	F	\neg
F	T	\neg
F	F	\neg

Rules: (operations \rightarrow new stuff from old stuff)

(compound proposition)

- ① unary operations
- ② binary operations
- ③ "Same"?

① Negation $\neg P$: "It is not the case that P "

P	$\neg P$
T	F
F	T

② Conjunction $P \wedge Q$: "P and Q"

P	Q	$P \wedge Q$
T	T	T
T	F	F
F	T	F
F	F	F

③ Disjunction / inclusive or $P \vee Q$: "P or Q"

P	Q	$P \vee Q$
T	T	T
T	F	T
F	T	T
F	F	F

④ Exclusive or $P \oplus Q$: "P or Q, but not both"

P	Q	$P \oplus Q$
T	T	F
T	F	T
F	T	T
F	F	F

⑤ Implication $P \rightarrow Q$: "If P, then Q"

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

trivial truth

vacuous truth

- "P only if Q"
- "P is sufficient for Q"
- "Q is necessary for P"
- "I whenever P"