Learning Goals

- Identify statements and predicates
- Translate English predicates to math predicates
- Create proofs using truth tables

Which are statements?

1. If the input has x bits, this algorithm* uses at most $2x^2$ operations.
2. For all $x > 10$, if the input has x bits, this algorithm* uses at most $2x^2$ operations.
3. This sentence (the one you are reading right now) is false.
4. Is QuickSort faster than MergeSort?

*Assume I've given you a description of some particular algorithm.

		"If P then Q"	"P if and only if Q"	"P and Q"	"P or Q"	"not P"
P	Q	$P \rightarrow Q$	$P \leftrightarrow Q$	$P \wedge Q$	$P \vee Q$	$\neg P$
T	T	T	T	T	T	F
T	F	F	F	F	T	F
F	T	T	F	F	T	T
F	F	T	T	F	F	T

		"If P then Q"	"P if and only if Q"	"P and Q"	"P or Q"	"not P"
P	Q	$P \rightarrow Q$	$P \leftrightarrow Q$	$P \wedge Q$	$P \vee Q$	$\neg P$
T	T	T	T	T	T	F
T	F	F	F	F	T	F
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T	T	T	T	T	T	F
T	F	F	F	F	T	F
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T	F	F	F	F	T	F
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T	T	T	T	T	T	F
T	F	F	F	F	T	F
F	T	T	F	F	T	T
F	F	T	T	F	F	T

Please Memorize (will get practice on Pset 1).
(To speak a new language, you need to memorize some vocab.)

Truth Table Proof

- Prove $(P \rightarrow Q) \vee (Q \rightarrow R)$ is true using a truth table.
- Explain in words why it is true without a truth table.
- Prove: $(P \rightarrow Q) \leftrightarrow (\neg P \vee Q)$ (can extend original table)

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