Math 55 Lecture 1 (Sections 1.1, 1.3)

Course website:
http://math.berkeley.edu/~williams/55.html

Office hrs (tentative): Mon: 3:30-4:30, Tues: 2-3:30

Logistics:

Homework: 15% Due each Wed at beginning of section.
(1st hw due in ≈2 weeks)

Midterms: 25% each. Feb 13, April 10 in class.

Final: 35% May 10, Thurs. 3-6pm, no makeups.

No makeups. If you miss a midterm, we'll use your final grade to replace it. Also, if you do better on final than midterm, will use final grade to replace midterm.

Book: 7th edition of Rosen or custom version of 7th edition of Rosen

Read relevant sections of book before lecture!

Bcourses:

Notes:

Section 1.1 Propositional Logic

Def: A <u>proposition</u> is

Ex:
1.
2.
3.
4.

Which propositions are true?

Ex: Which of the following are propositions?

0.
1.
2.
3.
4.
5.

Use letters to denote <u>propositional</u> <u>variables</u>,

i.e.

The <u>truth</u> <u>value</u> of a proposition is true (T) or false (F) based on whether

Def: Let p be a proposition. The negation of p, denoted $\neg p$ (or $\overline{p}$) is

Ex: What is negation of

We can make new propositions from old ones.

Def: Let p and q be prop's. The conjunction of p and q, denoted $p \wedge q$,

The disjunction of p and q, denoted $p \vee q$,

Q: How do we write (a) and (b) above using symbols?

The <u>exclusive or</u> of p and q, $p \oplus q$, is

<u>Caution</u>:

In math, the inclusive or is most common.
So pronounce $\vee$ as
$\oplus$ as

Prop's formed from $\vee, \wedge, \oplus$ are

<u>Truth</u> <u>table</u> for $\wedge, \vee, \oplus$

p	q	$p \wedge q$	$p \vee q$	$p \oplus q$

<u>Def</u>: Let p and q be prop's. The <u>conditional</u> <u>statement</u> $p \to q$ is the proposition which is

Ex: Let p and q be the prop's

New conditional statements from old:
Consider prop. $p \rightarrow q$. Related prop's are:

1.
2.
3.

Def: The biconditional statement $p \leftrightarrow q$ is the prop

Section 1.3 Propositional Equivalences

Def: A compound prop that is always true regardless of the truth values that occur in it is

Ex:

Def: Two compound prop's p and q are **logically equivalent**

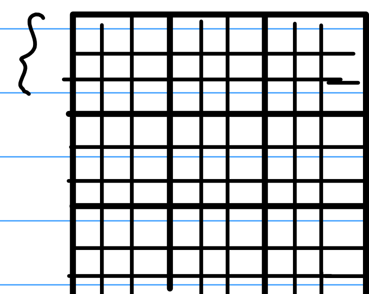
Exercise

Truth Table:

p	q	$p \vee q$	$\neg p$	$\neg p \to q$

De Morgan's Laws:

$\boxed{\text{Sudoku}}$ A puzzle consisting of 9×9 grid, some boxes blank & other boxes contain a number between 1 and 9.

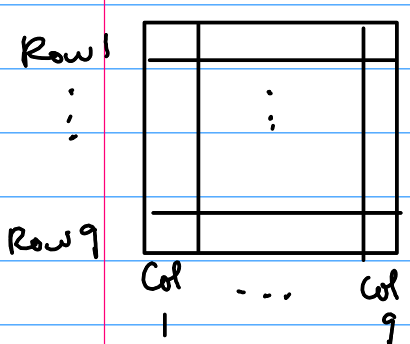


Goal: Put one number between 1 and 9 into each blank box so that:

-

-
-

If we have filled each box with a number, we want to represent the rules of Sudoku by propositions: then we could have a computer check if we have a solution to the puzzle.



Let $p(i,j,n)$ be the proposition