

Internet searches

1. (sue AND kim)
2. (sue AND (kim OR mo))
3. ((sue AND kim) OR mo)

What do these searches mean?

	a	b	a AND b	a OR b	a	NOT a
1	✓	✓	✓	✓	✓	✗
2	✓	✗	✗	✓	✗	✓
3	✗	✓	✗	✓		
4	✗	✗	✗	✗		

Applications:

1. Using the tables above we can determine which pages will appear in the results of any search using AND, OR and NOT
2. We can prove that some searches are equivalent to other searches
3. We can prove that for any search there is one that produces the same results but uses only 'AND' and 'NOT'.
4. We can prove that exactly 16 distinct searches can be made using 2 search terms (including e.g, (sue AND mo), (sue AND NOT mo) ...).

Optional Exercises:

1. Create a search that matches all pages.
2. Create a search that matches all pages without using OR.

Optional Exercise:

Which logical principles are involved in solving a sudoku puzzle?

	4	2		7	5	6		
	9		4		8			3
					6		1	5
		9			7	5	6	
7		3				8		1
	8	4	9			2		
4	3		1					
8			6		9			7
		6	7	5		1	4	

Sudoku from
The Times,
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Lexical ambiguity
e.g. Give me a note

Structural ambiguity
e.g. Two puffins ate six fish
e.g. the boy hit the girl with long hair
e.g. No one hates a man after he shoots him
e.g. You can have bacon and eggs or beans

How do we define what counts as a sentence of FOL?
Using rules.

- e.g.:
1. If * and # are sentences, then $(* \wedge \#)$ is a sentence
 2. If * and # are sentences, then $(* \vee \#)$ is a sentence

Rules are trees.

