Examples of propositions:

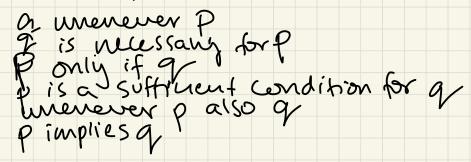
 $n(n+1)^2$ is even if n^2 even per neuen if $x \in \mathbb{R}$, $y \in \mathbb{Q}$ pren $xy \in \mathbb{Q}$ for ints n for ints n for X, y E R i JZ is not rational In proofs, we've done n even =7 n = 2c Gr cEZ =7... ("implies that") nx, ny e Z => nx ny e Z J2 rapional = > -- => false (contradiction) we can construct compound prop. out of smaller (atomic) prop. p Ccan't be boken down if n is integer peur n(n+1)² even 9. Syntax US. Semantics (for a given lavguage) (neaning of a grammatically grammatically coment (for a given lavguage)

let p, q be prop. natural lang syntax informal semantics pand q por qr Pnot pr if pmeng pifand only; fg pexclusive or q $p \wedge q$ $p \vee q$ $p = 7q (p \rightarrow q)$ p = 7q $p \oplus q$ T iff both p, g T T iff = 1 of p, g T T iff p is falle T iff when p T, g T T iff p, g widten T iff p, g wismatch T formal semantics (tauto table) 4 4 4 PTTFT Prg THFF F F \top P PAg Sisodd 2 is even Τ T and \Box F F y is odd Ŧ 2 is even and 1 is even and T 3 isodd FF FF and FZ is odd z is even

if / press

true iff p "forces" q (false if p doesn't it's a promise mat force q) unenever p T, q also T so p=7q is F when that promise is broken That is, men p is T and q is F, p=7q is F ex If it rains preve me grass is wet. rains grass wet rain=> grass unen is a t T T T T F: F F F F T F T T

if poren q can also be united as:

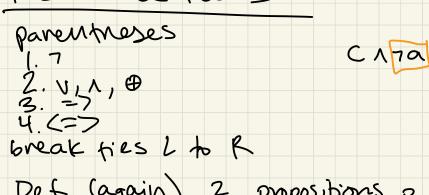


Def 2 propositions are logically equivalent iff their put tables are the 0 same p - 7p - 7p T = T F = TF = T

Det prop p is Satisfiable iff its fruch table has at least one T. that is, it's frue under at clast one fruch assignment. Det A prop. is a <u>factology</u> iff every row of me hum fable is T ex (p=7q) V p scraten work P q p = 7q (p = 7q) v pQ Suppose we have propositions p,q,r. How many rows does the put fable 8. In general, 2°. One for each of ET,F3. $2\tau, F^{3} = 2\tau, F^{3} \times 2\tau, F^{3} \times \cdots \times 2\tau, F^{3}$ n fimes for n=3, 27, F) x 2 T, F) × {T, F} = } < T, T, T7, < T, T, F) - 3

4 tru 2	1 ml -m - = E	1 QN terbi 3.	restig	$r = \frac{1}{2}$	~ n (b 7	v (cr	10W:	s doe have	estre
truth table for									
a	6	C	٦Q	CATA	k	N(C	17a)	(a_)	br (crz)
T	Т	T							
T T	エルエ	FT							
F	F	F							
F	Τ Γ	F)	J				
7	F	F)	

Precedence fules



Det (again) 2 propositions p, q ave logically equivalent if their thick tables ave the same. we unde P=q if this is true.

$\gamma(pvq) \equiv 1p \wedge 7q$

De Morgan's Law: (AUB) = (ANB)