Examples of propositions:

for ints n for ints n for nears r,y  $n(n+1)^2$  is even if n<sup>2</sup> even, men neven if xER and yER men XYER 52 is not rational In proofs, we've done things like: n even => n=2c for EZZ ("implies that") nx, ny EZ => nx ny EZ 52 rational => ··· => ··· => false (contradiction) n int =7 n is even or odd we can construct compound propositions out of smaller (atomic) propositions. I can't be broken down any smaller Sytax vs. semantics neaving of a gramatically correct sentence or statement G grammatically (For given language)

let p,q be propositions.

informal semantics natural lang. syntax t iff both p,q T T iff \$1 of \$,q T T iff p is F T iff men p T, q T T iff p,q match T iff p,q match pand q por q not p if p tun q A d d d d d d pifondonlyifg pexclusive or q þ⊕ q' formal semantics P pvq P p2=>q p⊕g pro 7p p=>q T F T + F T T F T F F F T F Т F T T Ŧ F TF FF T T F Т F F Τ 3 is odd e× Т and 2 isever and 4 is odd 2 is even F is even and 3 is odd FF 3 is even and 2 is odd 3 is odd Τ 2 iseven BY 2 is even 4 is odd T Dr 1 is even 3 is odd Т or F 3 is even 2 is odd or not (2 is even) Not (2 is odd) F T

if/men

true iff p "forces" q it's a promise mat whenever pT, q also T so p=7q is F unen that promise is broken. That is, unen p is T and q is F.

Т

F F

T

 $\checkmark$ 

メイ

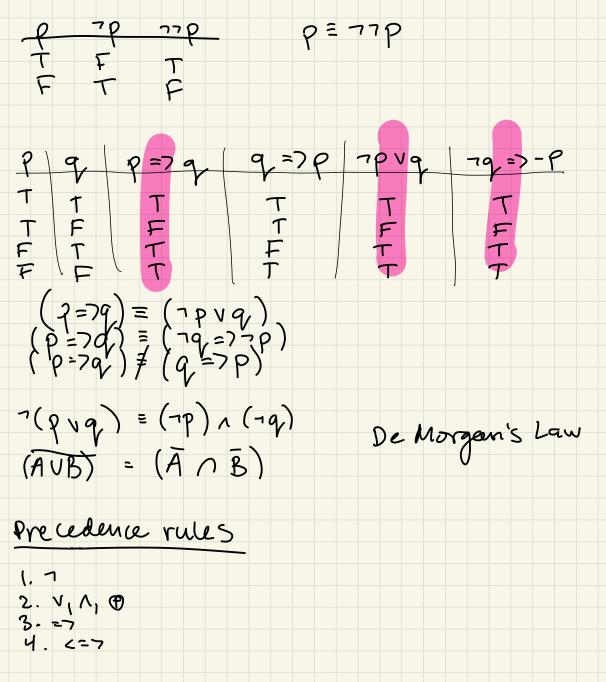
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T F

T

ex if it rains then the grass is wet. When is this a lie? rains grass wet

if p hon q (an also be written as: q whenever p f is necessary for p B only if q b is a sufficient condition for p whenever p also q p implies q Q suppose we have propositions P, q, r. how many rows does the truth table have? 2<sup>n</sup>. One for each of 2T,F3<sup>n</sup>. (recall set notation) 2 T,F3 x ET,F3 = 2 < T, T7, < T, F7, < F, T7, < F, F73 2 T,F3<sup>3</sup> = 2 < T, T, T7, < T, F7, ... } Det 2 propositions are log; cally equivalent, written =, iff their turn tables are the same.



Det Prop p is satisfiable iff it is the under at least one thit assignment. That is, at last one vow of the thin table evaluates to T.

er pvgp

## Det A prop. is a failtdogy if every row of the frith table is the.

<u>ex</u> (p=>q) ^ p