CS311H
Discrete Math for CS: Honors

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TA: Matthew Hausknecht
Proctor: Sudheesh Katkam

Department of Computer Science
The University of Texas at Austin

Good Morning, Colleagues

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Are there any questions?

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  - And ask in class!

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- Quizzes may happen in class or discussion section

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- CNF and DNF (single term "and" or "or")
  - Why do we care in practice?
- Distributing negation over quantifiers

Simplify

- $(\neg T \vee F) \wedge (\neg F \vee T) \wedge \neg(F \vee F)$

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- $\neg(F \vee \neg(T \wedge \neg(\neg T \vee \neg(F \wedge T))))$

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- $\neg(F \vee \neg(T \wedge \neg(\neg T \vee \neg(F \wedge T))))$
  $\equiv \neg(F \vee \neg(T \wedge \neg(\neg T \vee \neg F)))$
  $\equiv \neg(F \vee \neg(T \wedge \neg(F \vee T)))$
  $\equiv \neg(F \vee \neg(T \wedge \neg T))$
  $\equiv \neg(F \vee \neg(T \wedge F))$
  $\equiv \neg(F \vee \neg F)$
  $\equiv \neg(F \vee T)$
  $\equiv \neg T$
  $\equiv F$

Satisfiable?

- $(P \vee Q) \wedge (P \vee \neg Q) \wedge (\neg P \vee Q) \wedge (\neg P \vee \neg Q)$

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- $(P \vee Q) \wedge (P \vee \neg Q) \wedge (\neg P \vee Q) \wedge (\neg P \vee \neg Q)$
- $\neg(A \vee C \vee \neg(B \wedge \neg A \wedge \neg(\neg B \vee A \vee C)))$

CNF, DNF, or neither? (and convert)

- $(A \wedge \neg B) \vee (B \wedge \neg C)$

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- $(A \wedge \neg B) \vee (B \wedge \neg C)$
- $(A \wedge B) \vee (\neg B \wedge C) \vee \neg(A \wedge C)$

Prove equivalence

- $A \wedge (B \vee \neg(C \wedge \neg B \wedge (\neg A \vee \neg C))) \equiv A$

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  $A \wedge (B \vee \neg(C \wedge \neg B \wedge (\neg A \vee \neg C)))$ (original)

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  $\equiv A \wedge (B \vee \neg(\neg B \wedge ((C \wedge \neg A) \vee (C \wedge \neg C))))$ (dist.)

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  $\equiv A \wedge (B \vee \neg(\neg B \wedge ((C \wedge \neg A) \vee F)))$ (negation)

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  $\equiv A \wedge (B \vee B \vee \neg C \vee A)$ (De Morgan, double neg)

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  $\equiv A$ (absorbtion)

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- Module 3 with associated readings

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- Start on first HW assignment (requires module 3 to complete)