2018年8月8日 星期三

Discrete Math 2018

problem set 2

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1. Using logic equivalence to show that $(p \to r) \vee (q \to r) \equiv (p \wedge q) \to r$
2. List common logic equivalences
3. List absorption laws
4. Give **contrapositive, inverse and converse** of p → q.
5. Using logic equivalence to show $(P \wedge (P \to Q) \to Q) \equiv 1$
6. State difference between conjunctive normal form (CNF) and disjunctive normal form (DNF)
7. Translate $(P \to Q) \wedge (\sim P \to Q)$ to CNF and DNF separately.
8. Choose logics that are not propositions.
   A. Socrates is a man.
   B. If Socrates is a man, then Socrates is mortal.
   C. Therefore, Socrates is mortal.
   D. “x is human.”
   E. “x is the parent of y.”
   F. “$x+2=x^2$.”
   G. H(x) = “x is human.”
   H. P(x,y) = “x is the parent of y.” •
   I. Q(x)=“$x+2=x^2$.”
9. State the quantifier version of De Morgan’s laws.

10. Use nested quantifiers to express the following statements and give explanations.

    A. “there is no largest prime number”.

    B. $\lim_{x \to \infty} f(x) = y$

11. Let likes(x, y) denote the predicate that x likes y. Explain the following two predicates and state their difference

    A. ∀x∃y : likes(x, y)

    B. ∃y∀x : likes(x, y)

12. “No cows are blue” can be expressed by $\sim \exists x : Cow(x) \wedge Blue(x)$. Give the other four versions and explain each of their derivations.