Discrete Maths Mid-Term Tips

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1 Disclaimer

1. Teacher gave ZERO tips. These ones below are those that will trip me in exams, so yea.

2 Chapter 1

1. Symbols:
   (a) Negation: $\sim p$
      i. Note :$\sim p$ is NOT a compound statement
   (b) Conjunction: $\wedge$
   (c) Inclusive, $\vee$
   (d) Exclusive, $\veebar$
      i. $p \veebar q$, $p \ q, pXORq$
   (e) NAND, $|$, scheffer stroke
   (f) NOR, $\downarrow$, pierce arrow
   (g) Logical equivalence:
      i. $P \equiv Q$ or $P \iff Q$
   (h) Tautology: t
   (i) Contradiction: c
   (j) Contingency: Not t or not c
   (k) Biconditional: $p \leftrightarrow q$
      i. "p, if and only if, q"
      ii. p iff q
      iii. p is a necessary and sufficient condition for q
   (l) $p \rightarrow q$
      i. if p then q
      ii. p is **sufficient** for q

iii. p is a **sufficient** condition for q
iv. p only if q
v. q is **necessary** for p
vi. q is a **necessary** condition for p
vii. q if p
viii. q unless $\sim p$
ix. $\sim p \vee q$
x. Logically equivalent to its contrapositive ONLY.

2. Order of operations:
   (a) $\sim$
   (b) $\wedge, \vee$
   (c) $\rightarrow, \leftrightarrow$
3. Duality
   (a) s^d : Flip all $\wedge$ and $\vee$
   (b) If $s \iff r$, then $s^d \iff r^d$
4. Disjunctive/Conjunctive (DNF/CNF) and **principle** disjunctive/conjunctive (PDNF/PCNF)
   (a) Disjunctive: Sums-of-products
      i. Principle: Minterms OR Sum-of-product **canonical** form
   (b) Conjunctive: Product-of-sums
      i. Principle: Maxterms OR Product-of-sums **canonical** form
   (c) Elementary sum/product: DNF/CNF with simple statements only (including negations)
   (d) Tautalogy: No maxterms
   (e) Contradiction: No minterms
5. Arguments
   (a) All except last $\therefore$ statement are hypothesis. The last one is conclusion.
   (b) Valid iff *conclusion* $\rightarrow$ *hypothesis*
6. Gates
   (a) AND, OR, NAND, NOR
   (b) **Never combine two input wires**
   (c) **Recognizer**: 1 for one-and-only 1 combination