



PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

First Exam A

DISCRETE STRUCTURES

18-11-2007

Part 1 Each problem is worth 2 points. Circle one answer.

- 1) Suppose $p \equiv F$ and $q \equiv T$. Which proposition is false?
a) $(\neg p \vee q) \rightarrow \neg p$ b) $(p \wedge q) \rightarrow \neg q$
c) $(p \vee \neg q) \rightarrow \neg p$ d) $(\neg p \vee \neg q) \rightarrow \neg q$
- 2) Convert the proposition $(\neg p \oplus q) \wedge (\neg p \leftrightarrow \neg q)$ to CNF.
a) $(\neg p \vee \neg q) \wedge (p \vee \neg q)$ b) $(\neg p \vee q) \wedge (p \vee \neg q)$
c) $(\neg p \vee \neg q) \wedge (p \vee q)$ d) $(p \vee \neg q) \wedge (p \vee q)$
- 3) Let $P(x,y): y - x^2 < 0$. Which proposition is false?
a) $\exists x \forall y P$ b) $\forall x \exists y P$ c) $\exists y \forall x P$ d) $\forall y \exists x P$
- 4) Which one has the largest value?
a) $1234 \bmod 10$ b) $36 \bmod 12$
c) $10 \bmod 11$ d) $100 \bmod 13$
- 5) Evaluate $\text{LCM}(156, 288)$.
a) 7488 b) 3744 c) 1872 d) 11232
- 6) Convert the decimal number 2007 to hexadecimal.
a) 6DB b) 7EB c) 6C7 d) 7D7

Part 2 Each problem is worth 4 points. Write complete solution.

- 7) Prove: if $2x^2 - 3x + 7$ is odd then x is even.
- 8) Prove by mathematical induction for all integer $n \geq 1$.
$$2 + 4 + 6 + 8 + 10 + \dots + 2n = n^2 + n$$

-Amin Witno