



PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

First Exam A

DISCRETE STRUCTURES

9-4-2007

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

- 1) Convert the proposition $(p \oplus q) \oplus r$ to CNF.
a) $(\neg p \vee \neg q \vee r) \wedge (\neg p \vee q \vee \neg r) \wedge (p \vee \neg q \vee \neg r) \wedge (p \vee q \vee r)$
b) $(\neg p \vee \neg q \vee \neg r) \wedge (p \vee q \vee \neg r) \wedge (p \vee q \vee r) \wedge (p \vee \neg q \vee r)$
c) $(p \vee q \vee r) \wedge (p \vee \neg q \vee \neg r) \wedge (\neg p \vee q \vee \neg r) \wedge (\neg p \vee \neg q \vee \neg r)$
d) $(\neg p \vee \neg q \vee r) \wedge (p \vee \neg q \vee r) \wedge (\neg p \vee q \vee r) \wedge (p \vee q \vee r)$
- 2) Let $P(x,y): x^2 - y > 0$. Which proposition is false?
a) $\exists x \forall y P$ b) $\forall x \exists y P$ c) $\exists y \forall x P$ d) $\forall y \exists x P$
- 3) Evaluate $\text{GCD}(2571, 1572)$.
a) 6 b) 1 c) 12 d) 3
- 4) Convert the decimal number 2571 to hexadecimal.
a) A0F b) AB0 c) ABF d) A0B

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

- 5) Is this argument valid?
Premise 1 Today is Friday if and only if tomorrow is Sunday.
Premise 2 Tomorrow is not Sunday.
Conclusion If tomorrow is not Sunday then today is not Friday.
- 6) Prove by mathematical induction for all integer $n \geq 1$.
$$1 + 6 + 36 + \dots + 6^{n-1} = \frac{6^n - 1}{5}$$
- 7) Find an explicit formula for $f(n)$ satisfying
 $f(n) = -2f(n-1) + 8f(n-2)$
 $f(0) = 1$
 $f(1) = 2$

-Amin Witno