



PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

First Exam A

DISCRETE STRUCTURES

22-11-2011

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

- 1) The proposition $\neg p \rightarrow q$ is equivalent to
a) $p \vee \neg q$ b) $\neg p \vee q$ c) $p \vee q$ d) $\neg p \vee \neg q$
- 2) Which one is a contingency?
a) $\neg p \leftrightarrow \neg p$ b) $p \rightarrow p$ c) $\neg p \rightarrow p$ d) $\neg p \oplus \neg p$
- 3) Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 3, 5, 7, 9\}$. Then $|P(A \oplus B)| =$
a) 4 b) 8 c) 16 d) 32
- 4) The set $(A - B) \oplus (A \cup B) =$
a) B b) $A \oplus B$ c) $A \cup B$ d) $A \cap B$
- 5) Let $A = \{1, 2, 3, 4\}$ and $R = \{(x, y) \mid x + y > 2\}$. Which one is true?
a) reflexive b) symmetric and transitive
c) anti-symmetric d) symmetric only
- 6) Which relation is anti-symmetric?

a) $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$

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

- 7) Convert $(p \rightarrow r) \wedge q$ to DNF.
- 8) Find the transitive closure of the given relation $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$.