

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Discrete Structures (210104)
Discrete Mathematics (210242, 241250)

Paper: Exam 2 A
Date: May 23, 2006
Time: 02:10 – 03:00

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Name:

No.

Circle the right answer of the following 10 questions (2 points each)

1. Which of the following sets is empty?
a) $(A \oplus B) - B$ b) $A \cap (A - B)$ c) $A - A^c$ d) $A \cap (B - A)$

2. If $A = \{a, b, c, d, e, f\}$ then $|P(A)| =$
a) 6! b) 36 c) 64 d) 12

3. Number of different permutations of $\{a, b, c, d, e, f, r\}$ which contain the word **car** are
a) 7! b) 210 c) 5! d) 128

4. Number of different permutations of $\{a, b, c, d, e, r, s\}$ which do not contain the words **car or beds** are
a) 7! b) 142 c) 2! d) 144

5. Let $A = \{1, 2, 3, 4, 5\}$ and $R = \{(a, b) \mid a + b < 8\}$ be a relation from A to A. Which of the following properties describes R?
a) reflexive and symmetric b) symmetric and transitive
c) anti-symmetric and transitive d) symmetric and not anti-symmetric

6. How many positive integers ≤ 500 which are **not** multiple of 20 **or** 30?
a) 427 b) 373 c) 467 d) non of the above

7. What is the minimum number of students so that 15 of them are born in the same day of the week?
a) 99 b) 98 c) 106 d) 90

12. Let $A = \{1, 2, 3, 4, 5\}$. Which of the following is an equivalence relation on A?
a) $R = \{(a, b) \mid a \text{ divides } b\}$
b) $R = \{(a, b) \mid a \bmod 3 = b \bmod 3\}$
c) $R = \{(a, b) \mid a \bmod b = 0\}$
d) $R = \{(a, b) \mid b \bmod a = 3\}$

13. Let $A = \{1, 2, 3, 4, 5\}$. Which of the following is a partial order relation on A?
a) $R = \{(a, b) \mid b \bmod a = 3\}$
b) $R = \{(a, b) \mid a \bmod b = 0\}$
c) $R = \{(a, b) \mid a + b \text{ is even}\}$
d) $R = \{(a, b) \mid a \bmod 3 = b\}$

14. Let $A = \{2, 3, 6, 9, 18\}$ and R be a partial order relation from A to A defined by $R = \{(a, b) \mid a \text{ divides } b\}$. Find the elements of R, then draw the digraph and the Hasse diagram of R.