

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Discrete Structures (210104)
Discrete Mathematics (210242)
Discrete Mathematics (250151)
Dr. Amin Witno & Dr. Anwar Fawakhreh

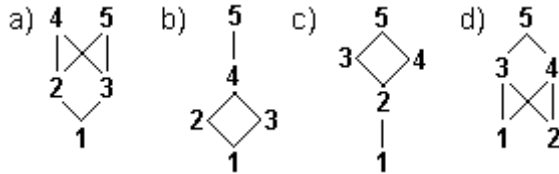
Paper: Final Exam (A)
Date: 9 February 2005
Time: 12:00 – 14:00
Student:

Circle one answer. Each problem is worth 3 points, up to 50 points maximum mark.

1. Convert the decimal number 1234 to hexadecimal.
a) 4D2 b) 52C c) 4DB d) 53E
2. In a mathematics exam there were 11 possible marks for a student to get (0 is the lowest and 10 is the highest mark). What is the minimum number of students in order for at least 7 of them received the same mark?
a) 56 b) 67 c) 78 d) other answer
3. Which matrix represents an equivalence relation?
a) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$
4. Let $A = \{1, 2, 3, 4\}$ and $R = \{(a, b) \mid a + b > 5\}$ be a relation from A to A. Which of the following properties describes R?
a) symmetric and not transitive
b) transitive and not reflexive
c) reflexive and transitive
d) not symmetric and not transitive
5. How many positive integers ≤ 200 which are not multiples of 12 or 20?
a) 176 b) 177 c) 180 d) 184
6. Convert the hexadecimal number 1AB to binary.
a) 101101011 b) 101101111
c) 101101011 d) 110101011
7. Evaluate GCD (1232, 2132).
a) 1 b) 2 c) 4 d) other answer
8. Convert the proposition $(p \wedge q) \vee (p \wedge \neg q)$ to CNF.
a) $(p \vee \neg q) \wedge (p \vee q)$ b) $(\neg p \vee q) \wedge (p \vee q)$
c) $(\neg p \vee \neg q) \wedge (p \vee q)$ d) $(\neg p \vee \neg q) \wedge (p \vee \neg q)$
9. Which proposition is equivalent to $q \rightarrow \neg p$?
a) $\neg p \rightarrow q$ b) $p \rightarrow \neg q$ c) $p \rightarrow q$ d) $q \rightarrow p$
10. If $|A| = 8$ then how many subsets of A have exactly 5 elements?
a) 120 b) 126 c) 84 d) 56

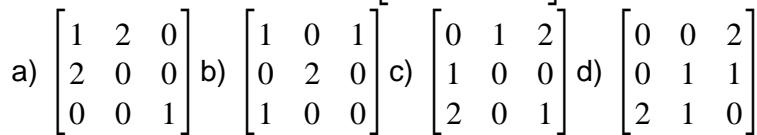
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11. Let $A = \{1, 2, 3, 4, 5\}$ and $R = \{(1,1), (1,2), (1,3), (1,4), (1,5), (2,2), (2,4), (2,5), (3,3), (3,4), (3,5), (4,4), (4,5), (5,5)\}$ is a partial order relation on A . Draw the Hasse diagram of R .



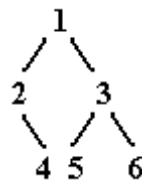
12. A complete graph K_n has 28 edges. What is n ?
a) 6 b) 7 c) 8 d) 9

13. Convert the incidence matrix $\begin{bmatrix} 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \end{bmatrix}$ to adjacency matrix.



14. Which graph is not planar and is a tree?
a) $K_{2,3}$ b) $K_{1,4}$ c) K_5 d) no correct answer
15. Which graph is an Euler path but not circuit?
a) $K_{2,2}$ b) $K_{2,3}$ c) $K_{1,3}$ d) no correct answer

16. Apply the post-order algorithm for this labeled binary tree.



- a) 2-4-3-5-6-1 b) 4-5-6-2-3-1
c) 2-4-5-6-3-1 d) 4-2-5-6-3-1

17. Apply the in-order algorithm for the same tree in number 16.
a) 4-2-1-3-5-6 b) 1-2-4-3-5-6
c) 2-4-1-5-3-6 d) 4-2-1-5-3-6

Answer Key:

- 1) A 2) B 3) A 4) A 5) B 6) D 7) C 8) A 9) B 10) D
11) B 12) C 13) C 14) D 15) B 16) D 17) C