

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Discrete Structures	(210104)	Paper:	Final Exam (A)
Discrete Mathematics	(210242)	Date:	14 June 2005
Discrete Mathematics	(250151)	Time:	12:00 – 14:00

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Circle the best choice. Each problem is worth 2.5 points.

- Which proposition is a contingency?
(a) $p \rightarrow \neg p$ (b) $p \oplus \neg p$ (c) $\neg p \leftrightarrow p$ (d) $\neg p \vee p$
- Which equivalence is not correct?
(a) $p \rightarrow q \equiv \neg p \vee q$ (b) $q \rightarrow \neg p \equiv p \rightarrow \neg q$
(c) $p \oplus q \equiv \neg p \leftrightarrow q$ (d) $p \oplus \neg q \equiv \neg p \leftrightarrow q$
- Let $P(x, y) : x^2 + y \geq 0$. Which propositions is false?
(a) $\forall x \exists y P(x, y)$ (c) $\forall y \exists x P(x, y)$
(b) $\exists x \forall y P(x, y)$ (d) $\exists y \forall x P(x, y)$
- Convert the decimal number 732/718 to hexadecimal.
(a) 4DE (b) 2DC (c) 4DB (d) 2CE
- Evaluate GCD (273, 372).
(a) 1 (b) 2 (c) 3 (d) other answer
- Find an explicit formula for the following recurrence sequence.
 $f(0) = 1$
 $f(1) = 2$
 $f(n) = 4 f(n-1) - 4 f(n-2)$ for $n \geq 2$
(a) $f(n) = 2^n$ (b) $f(n) = 2^n + n(2^n)$
(c) $f(n) = n(2^n)$ (d) $f(n) = \frac{1}{2}(2^n) + 2n(2^n)$
- Which set is not empty?
(a) $A \oplus A$ (b) $A \cap (A - B)$ (c) $A - A$ (d) $A \cap (B - A)$
- How many positive integers ≤ 500 which are not multiples of 20 or 30?
(a) 427 (b) 373 (c) 467 (d) other answer
- How many words can be formed by permutations of the word SCIENCE?
(a) 56 (b) 5040 (c) 1260 (d) 210
- Let $R = \{(1,2), (2,2), (3,3), (3,4)\}$. Find R^2 .
(a) $\{(1,2), (3,3), (3,4)\}$ (b) $\{(1,2), (2,2), (3,4)\}$
(c) $\{(1,2), (2,1), (4,3), (3,4)\}$ (d) $\{(1,2), (2,2), (3,3), (3,4)\}$
- Let $A = \{1, 2, 3, 4, 5\}$ and $R = \{(a, b) \mid a + b \text{ is odd}\}$ be a relation from A to A . Which of the following best describes R ?
(a) symmetric and not transitive (b) transitive and not reflexive
(c) an equivalence relation (d) not symmetric and not transitive

12. Which matrix represents a partial order relation?

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

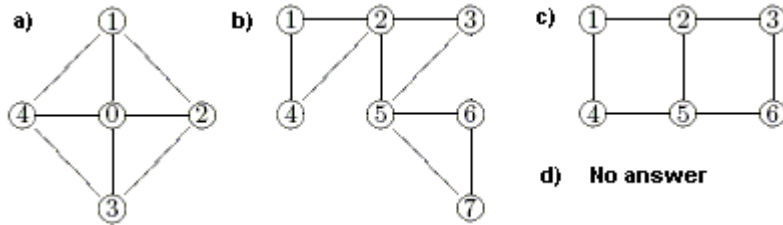
13. A complete graph K_n has 66 edges. What is n ?
 (a) 11 (b) 10 (c) 12 (d) other answer

14. What is the degree of the graph with degree sequence (1, 0, 2, 4, 2, 0, 1)?
 (a) 28 (b) 26 (c) 30 (d) other answer

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

(a) $\begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 0 \\ 2 & 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 0 & 2 \\ 0 & 1 & 1 \\ 2 & 1 & 0 \end{bmatrix}$

16. Which graph is an Euler path but not circuit?



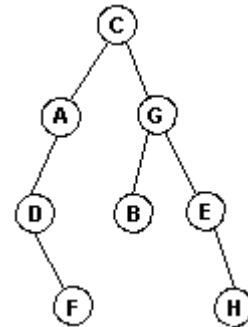
17. Which complete bipartite graph is also a tree?
 (a) $K_{2,3}$ (b) $K_{3,3}$ (c) $K_{1,5}$ (d) no answer

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

- (a) F, D, A, C, B, H, E, G (b) F, H, D, B, E, A, G, C
 (c) F, D, A, B, H, E, G, C (d) F, D, A, H, E, B, G, C

19. Apply the in-order algorithm for the same tree.

- (a) D, F, A, C, B, G, H, E (b) F, D, A, C, B, G, E, H
 (c) A, D, F, C, B, G, E, H (d) D, F, A, C, B, G, E, H



20. Find the value of a minimal spanning tree below:
 (a) 21 (b) 23 (c) 22 (d) 24

