編號： 125

國立成功大學 105 學年度碩士班招生考試試題

系　　所：工程科學系

考試科目：計算機數學

考試日期：0228，節次：3

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

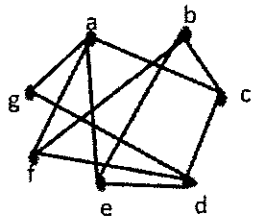
1. Suppose E is the event that a randomly generated bit string of length four begins with a 1 and F is the event that a randomly generated bit string contains an odd number of 0s. Are E and F independent, if the 16 bit strings of length four are equally likely? (10%)

2. What algebraic expression in a Boolean algebra corresponds to the statement p→q in the propositional calculus? (5%)

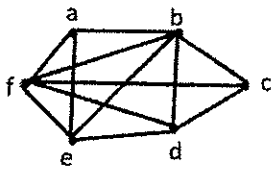
3. Draw a digraph for the divides relation, $x|y$, where the universe is $\|_6$, which consisting of the integers from 1 through 6. (10%)

4. How many strings of length 10 on the alphabet {A, B, C} have the letter C appearing at least once in any two successive letters? (15%)

5. Are the graphs A and B displayed in the following Figures bipartite? (10%)



Graph A



Graph B

6. Determine whether the sequence $\{a_n\}$is a solution of the recurrence relation a_n=$2a_{n-1} - a_{n-2}$ for $n = 2, 3, 4, \ldots$, where $a_n = 3n$ for every nonnegative integer n. Answer the same question where $a_n = 2^n$ and where $a_n = 5$. (15%)

7. A rooted tree is a tree with one of its vertices singled out. This vertex is called the root of the rooted tree. The weight of a vertex v in a rooted tree is defined to be 1-n, where n is the number of children of v. In the following list, it is shown the associated weights for the corresponding vertex. Reconstruct the tree. (10%)

vertices	a	b	a	b	c	c	d	e
weights	-1	-2	1	1	1	-1	1	1

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8. For any integers *a*, *b*, and *n*, the expression $a \equiv b \bmod n$, denoted as $(a)_n = b$, is defined to mean $(a - b) = qn$ for some integer *q*. Find all numbers *x* such that $(3x)_{19} = 5$. (15%)

9. Find the language recognized by the given deterministic finite-state automaton. (10%)