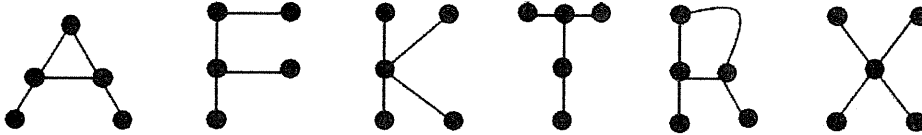


※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (10%) Consider the letters A, F, K, R, T, and X below. Which of them are isomorphic?



2. (20%) Let

$$X = \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$$

For $x, y \in X$, set $x R y$ if $x^2 < y^2$ or $x = y$.

(a) Show that R is a partial ordering on X

(b) Draw a Hasse Diagram of R

3. (15%) Find the value of sum after the given program segment is executed (Here i, j, k , *increment*, and *sum* are integer variables)

increments := 0

sum := 0

for i := 1 to 87 **do**

for j := 1 to i **do**

for k := 1 to j **do**

begin

increment := *increment* - 3

sum := *sum* + *increment*

end

next k

next j

next i

4. (20%) DNA (Deoxyribonucleic acid) is a molecule that carries the genetic instructions for all known organisms and many viruses. It consists of a chain of bases. In DNA chain, there are four types of bases: A, C, G, T. For example, a DNA chain of length 10 can be ACGTACGTAT.

(a) Let $g(n)$ be the number of configurations of a DNA chain of length n , in which no two T are consecutive and no two G are consecutive. Write a recurrence for $g(n)$.

(b) Solve the recurrence from part (a).

編號：182

國立成功大學 109 學年度碩士班招生考試試題

系 所：電機工程學系

考試科目：離散數學

考試日期：0210，節次：3

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5. (10%) Give any 7 distinct numbers, there must exist a sum or a difference of two numbers, where the sum or the difference is a multiple of 10. Please explain the reason.
6. (10%) We learned the notations of Big-O, Big-Theta and Big-Omega. However, when we estimate the efficiency of an algorithm, the most commonly used notation is Big-O. Why? Please write down your thinking.
7. (15%) A student council consists of three freshmen, four sophomores, four juniors and five seniors. How many committees of eight members of the council contain at least one member from each class?