資訊管理學系
銘傳大學九十二學年度資訊傳播工程學系碩士班招生考試
資訊工程學系
第四節
離散數學試題

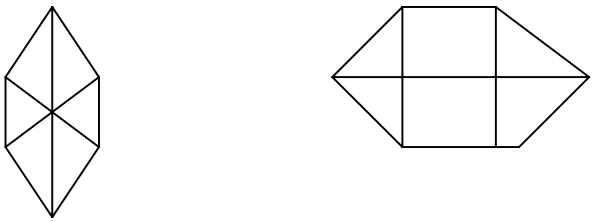
1. (10%)Let A, B be sets. Use set identities (basic laws of set theory) to prove that $(A-B)\cup(B-A)=(A\cup B)-(A\cap B)$
2. (10%)Prove that if $x^3-5x^2+3x+4=0$, *then* $\neq x$.
3. (10%)Use mathemathical induction to prove that for any positive integer n>1, $\frac{1}{\sqrt{1}}+\frac{1}{\sqrt{2}}+...+\frac{1}{\sqrt{n}}>\sqrt{n}$
4. (20%)This question concerns the recursive relations.

(a) Write a recursive definition for the sequence $\{a_n\}$, where $a_n = a^n$ *for* $n \geq 1$

(b) Consider another sequence $\{b_n\}$, whose recursive definition is as follows:

$b_1=0$, $b_2=2$, and $b_n=3b_{n-1}-2b_{n-2}$ for $n \geq 3$.Now, find a formula(in terms of n only)for b_n.

5. (10%)Are the following two graphs ***isomorphic***? Why?



6. (20%)In a string S, a subsequence is obtained by removing some characters out of S. For example, TTA is a subsequence of AGTCATA, but GGA is not.
   (a) Now, given any two strings, string s of length m and string t of length n, device an algorithm(in pseudocode) to check whether t is a subsequecnce of s.
   (b) Analyze the worse-case time complexity of your algorithm in (a).
7. (20%)Let (**S, R**) be a partially ordered set. **S** is a set of strings {TA, GC, GG, TGAC, TGGA, GAGTC, GTGT, GTGGTA, GAGTCGT} and **R** is the partial order relation defined on **S** where x**R**y means x is a subsequence of y.
   (a) Draw the Hasse diagram for **R**.
   (b) Find all maximal elements.
   (c) Find lub({GC, GC})
   (d) Find glb({GTGGTA, GAGTCGT})
   (e) Is this partially ordered set a lattice? Why?