銘傳大學 94 學年度 資訊工程學系 碩士班招生考試 資訊傳播工程學系

第二節 （第 1 頁共 1 頁）

離散數學 試題 （限用答案本作答）

每題 20 分

1. Given three arbitrary sets $A,B,C \subseteq U$. Prove or disprove the following statements.
   (a) $A \oplus A = \phi$
   (b) $(A-B)-C = A-(B \cup C)$
   (c) $(A \cup B) \cap (B \cup C) \cap (A \cup C) = A \cap B \cap C$
   (d) $\overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}$
2. Let $(S,*)$ be the group of all real numbers except -1 under the operation $*$ defined by $a*b = a+b+ab$. Show that $(S,*)$ is isomorphic to the group $\mathbf{R}^*$ of nonzero real numbers under multiplication.
3. Let R be a binary relation. Let $S = \{(a,b) \mid (a,c) \in R \text{ and } (c,b) \in R \text{ for some } c\}$. Show that if R is an equivalence relation, then S is also an equivalence relation.
4. Solve the following recurrence relations.
   (a) $a_{n+1} - a_n = 3^n, n \geq 0, a_0 = 1.$
   (b) $a_{n+2} - 3a_{n+1} + 2a_n = 0, n \geq 0, a_0 = 1, a_1 = 6.$
5. (a) If a connected planar simple graph has e edges and v vertices with $v \geq 3$ and no circuits of length 3. Show that $e \leq 2v-4$.
   (b) How many regions would there be in a planar graph with 10 vertices each of degree 3?

試題完