世新大學九十四學年度碩士班招生考試試題卷

學　系　別	考　試　科　目
資管系	離散數學

※考生請於答案卷內作答

1. For A={1,2,3},consider following relations ,R, decide if R is reflective, symmetric ,transitive or antisymmetric

(a) R={(1,2),(1,3),(2,3),(1,3)}　(2%)

(b) R={(1,1},(1,2),(2,2),(3,3),(3,1)}　(2%)

(c) R={(1,1),(1,2),(2,1),(2,3),(3,2)}　(2%)

(d) R={(1,2),(2,3)}　(2%)

(e) R={(1,1),(2,2),(3,3)}　(2%)

2. Find the recurrence relation , with initial condition, that uniquely determines each of the following geometric series. (12%)

(a)2,10,50,250,…..　(b)6,-18,54,-162,……

(c)1,1/3,1/9,1/27,……　(d)7,14/5,28/25,56/125,…..

3. Use the Euclidean algorithm to find(6%)

(a) gcd(12345,54321)　(b)gcd(9888,6060)

4. How many times must we roll a single die in order to get the same score(12%)

(a)　at least twice (b)　at least three times (c)　at least n times ,for n >=4 ?

5. How many arrangements of the letters in MISSISSIPPI have no consecutive S's?(5%)

6.Let T=(V,E) be a tree with ｜V｜= n>=2. How many distinct paths are there (as subgraphs) in T ?(10%)

7. Let A cross product B denoted by A×B ,for A, B, C ⊆U, prove that A×(B-C)=(A×B)-(A×C)(10%)

8. Seven town a, b, c, d, e, f, and g are connected by a system of highways as follows :(1)H11 goes from a to b and to c; (2)H33 goes from c to d and then b, end to f; (3)H44 goes from d through e to a; (4)H55 goes from f to g and to b; (5)H66 goes from g to d.

(a)Using vertices for towns and directed edges for segments of highways between towns, draw a directed graph that models this situation.
(b)List the pasths from g to a.
(c)What is the smallest number of highway segments that would have to be closed down for travel from b to d to be disconnected.
(d)Is it possible to leave town c and return there, visiting each of the other towns only once?
(e)What is the answer to part (d) if we are not required to return to c?
(15%) 9. Using the principle of inclusion and exclusion, prove that for m<=r<=n,

$$\binom{n-m}{n-r} = \sum_{i=0}^{m} (-1)^i \binom{m}{i} \binom{n-1}{r}$$