

臺中健康暨管理學院

九十二學年度碩士班暨碩士在職專班招生考試試題紙

系 所 別	組 別	考試科目	考試日期	時 間	備 註
資訊管理學系碩士班	--	離散數學	92.3.30	13:30-15:10	共一頁

1. State the De Morgan's laws for sets. (10%)
2. State the Pigeonhole Principle. (10%)
3. If X is an n -element set and Y is an m -element set, how many functions are there from X to Y ? (10%)
4. Let $R = \{(1,2), (2,2), (2,3), (3,1)\}$ be the relation on the set $\{1, 2, 3\}$.
Find the
 - (a) reflexive closure of R . (5%)
 - (b) symmetric closure of R . (5%)
5. Prove the following by induction: (10%)
 - (a) $6 \cdot 7^n - 2 \cdot 3^n$ is divisible by 4, for $n=1, 2, 3, \dots$
 - (b) $2^n \geq n^2$, $n=4, 5, \dots$
6. There are $\binom{2n}{n}$ possible global alignments between two sequences of length n .
 - (a) Give an approximation formula for $\binom{2n}{n}$ (5%)
 - (b) Order the integers among 10^{300} , $100!$, $\binom{2000}{1000}$. (5%)
7. Solve the equation $7x \equiv 2 \pmod{13}$. (10%)
8. Solve the recurrence relation

$$\sqrt{a_n} = \sqrt{a_{n-1}} + 2\sqrt{a_{n-2}}$$
 with initial conditions $a_0 = a_1 = 1$. (10%)
9. A connected planar graph has nine vertices having degree 2, 2, 2, 3, 3, 3, 4, 4, and 5. How many edges are there? How many faces are there? (10%)
10. Show that $K_{3,3}$ is not planar. (10%)