

系別：資訊工程學系三年級

科目：離散數學

本試題共 / 頁

1. Suppose that R_1 and R_2 are equivalent relations on the set S . Determine whether each of these combinations of R_1 and R_2 must be an equivalent relation. Please briefly explain your answer. (10%)
(1) $R_1 \cup R_2$ (2) $R_1 \oplus R_2$
2. Does there exist a simple graph with six vertices of these degrees? If so, draw such a graph. (20%)
(1) 0, 1, 2, 3, 4, 5 (2) 3, 2, 3, 2, 3, 2
(3) 3, 3, 3, 3, 3, 5 (4) 1, 2, 3, 4, 5, 5
(5) 2, 2, 2, 2, 2, 2
3. How many numbers must be selected from the set $\{1, 2, 3, 4, 5, 6\}$ to guarantee that at least one pair of these numbers add up to 7? Please briefly prove your answer. (15%)
4. There are 2504 computer science students at a school. Of these, 1876 have taken a course in Pascal, 999 have taken a course in Fortran, and 345 have taken a course in C. Further, 876 have taken courses in both Pascal and Fortran, 231 have taken courses in both Fortran and C, and 290 have taken courses in both Pascal and C. If 189 of these students have taken courses in Fortran, Pascal, and C, how many of these 2504 students have not taken a course in any of these three programming languages? (10%)
5. Prove that the square of an even number is an even number using a direct proof (10%)
6. Find a recurrence relation for the number of ways to climb n stairs if the person climbing the stairs can take one stair, or two stairs, or three stairs at a time. What are the initial conditions? How many ways can this person climb a flight of eight stairs? (20%)
7. Show that if n is an integer greater than 1, then n can be written as the product of primes. (15%)