朝陽科技大學九十三學年度碩士班招生考試試題

系所別：網路與通訊研究所

組　別：一般生

科　目：離散數學

1. (10%) Determine the sum of all the coefficients in the following items.
   (A) $(x+y)^3$
   (B) $(x+y+z)^{10}$

2. (10%) Prove the following equation by the principle of finite induction.
   $1^2+3^2+5^2+...+(2n-1)^2=(n)(2n-1)(2n+1)/3$

3. (10%) Determine how many integer solutions there are to $x_1+x_2+x_3+x_4=19$ where $0\le x_i<8$, $1\le i\le 4$

4. (10%) Solve the following recurrence relation.
   $a_{n+1}-2a_n=5$, $n\ge 0$, $a_0=1$.

5. (10%) Suppose A and B are sets defined as follows:
   A={x|x=2k+1 and k∈N} ; B={ x|x=3k+5 and k∈N}
   Please list the first four elements of A∩B

6. (10%) Suppose we need to count the strings of length 7 over the alphabet A={c,d,e,n,q,s,u} that ends with either s or c and contains both q and u in sequence. Please count the total number of the strings.

7. (10%) A student should take 5 courses in two fields, computer science and mathematics. Two courses are taken from computer science and three courses are taken from mathematics. There are four classes offered in the field of computer science and there are five classes offered in the field of mathematics. How many different ways that the student arranges the schedule? (Without consideration of the confliction between classes).

8. (10%) It is known that 1+2=3, 4+5+6=7+8, and 9+10+11+12=13+14+15. We can continue these equations forever. Please formulate a general summation for each side.
   Hint: The left side of each equation starts with a number of the form n^2.

9. (10%) For Boolean algebra:
(A)Simplify the Boolean expression $x(y+\bar{y}z)+\bar{y}z+yz$,
(B)Prove that (A∪B)'=A'∩B'.

10. (10%) Let G be a loop-free undirected graph on n vertices. If G has 56 edges and $\overline{G}$ has 80 edges, what is n?