1. CADBD DCCCA 2分
2. (1) conjunction OR  2分

(2)

(3) **x2+x+3**

(4) {(*a*, *b*)| *a doesn’t* divide b}

(5) yes

(6) any relation such that

(7) 7

(8)I did neither buy any lottery this week nor win the million dollar jackpot on Friday.

(9) {1,3,5,6,7,8,9}

(10) 

1. 5分



(2)



(3) Suppose that each appearance of x has the same domain . Then



(4) it is easy to see that.

a. assume R is reflexive.



Thus, Not reflexive.

b. assume R is symmetric.



Thus, symmetric.

c. It is easy to see that . Note that .

Thus, not antisymmetric.

d. , however, .

Thus, not transitive.

(5) there are 4 way to break the circuit. Thus there 4 spanning trees, which are isomorphic to each other..

(6)

Let  . Then is a bijection. We need to prove







Since h is a a bijection, we know x=z. thus



1. 10分
2. Let G=(V,E) be a graph.

Case 1. G is connected. The proof is trivial.

Case 2. G is disconnected. We assume G has n components, .

Consider . Let  For each, (, v) is disconnected in G because they are in distinct components. Thus, . It follows that . That is, (, v) is connected in  for each.

We can proof in the same way that () is connected in  for each.

We get that the vertexes in  are connected in .

It is easy to see that the vertexes in  are connected in .

1. .
2. Reflexivity. For any, it is oblivious that .
3. Symmetry. For any, we have



1. Transitivity. For any , , we have









Note the symmetry.

Step 1



Step 2. Consider the left one.



Step 3.