华东师范大学期末试卷（B）

2006—2007 学年第二学期

课程名称：软件工程数学

学生姓名：_____　　学　　号：_____

专　　业：_____　　年级/班级：_____

课程性质：专业必修

一	二	三	四	五	六	七	八	九	十	十一	十二	总分	阅卷人签名

一、（8 分）

Show the following statement.

Premises: $\forall x(F(x) \rightarrow (G(x) \wedge R(x)))$,

$\exists x(F(x) \wedge G(x))$

Conclusion: $\exists x(G(x) \wedge R(x))$

二、（8 分 ）

Let R **be an equivalence relation on a set** A**. Show that the following statements are equivalent.**

(1) a R b　　**(2)** [a]=[b]　　**(3)** $[a] \cap [b] \neq \varnothing$

（说明：$\varnothing$代表空集；[a]代表元素 a 所在的等价类）

三、(9 分)

How many strings of four decimal digits

(a) do not contain the same digit twice?

(b) end with an even digit?

(c) have exactly three digits that are 9**s?**

四、（6 分）

How many permutations (排列) of the letters *ABCDEFGH* contain

(a) the string *ED*?

(b) the string *BA* and *FGH*?

五、（10 分）

How many solutions are there to the equation $x_1+x_2+x_3+x_4+x_5+x_6=29$**,**

where x_i**,** $i=1,2,3,4,5,6$**, is a nonnegative integer such that**

(a) $x_i>1$ **for** $i=1,2,3,4,5,6$**?**

(b) $x_1<8$ and $x_2>8$**?**

六、（8 分）

Show that for every integer *n* there is a multiple of *n* that has 0s and 1s in its decimal expansion.

七、（6 分）

Given a formula for the coefficient of x^k **in the expansion of** $(x+1/x)^{100}$**, where** k **is an integer.**

八、（8 分）

(a) Find a recurrence relation for the number of bit strings of length *n* that contain two consecutive *0*s. Please briefly explain the reason.

(b) What are the initial conditions?

九、(10 分)

(a) Find all solutions of the recurrence relation $a_n=2a_{n-1}+2n^2$**.**

(b) Find the solution of the recurrence relation in part (a) with initial condition $a_1=4$**.**

十、（12 分）

(a) Please draw a graph with the given adjacency matrix below.

0	**0**	**1**	**1**
0	**0**	**1**	**0**
1	**1**	**0**	**1**
1	**1**	**1**	**0**

(b) Determine whether the given pair of graphs is isomorphic (同构). Please briefly explain the reason.

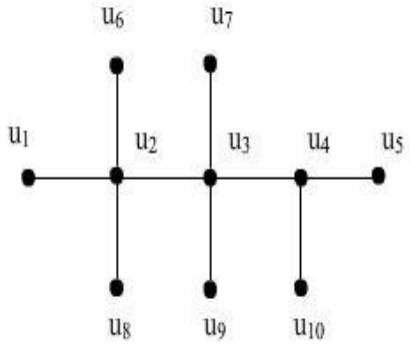


Figure (a)

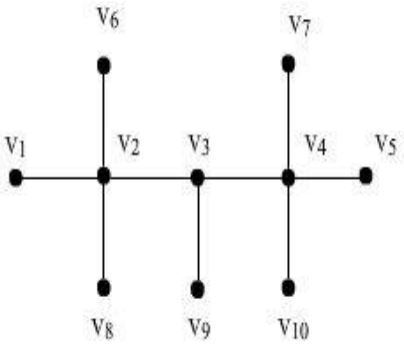
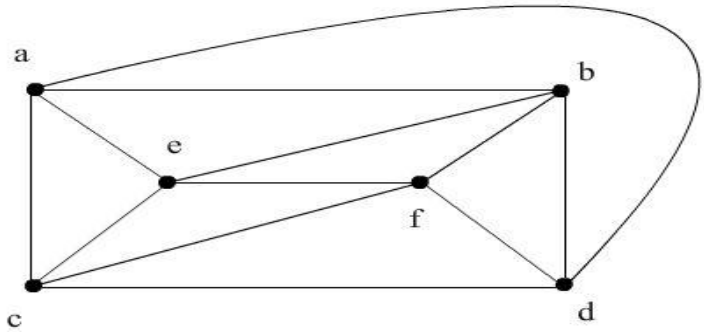


Figure (b)

(c) What is the sum of the entries in a row (行) of the adjacency matrix for an undirected graph? For a directed graph?

十一、（8 分）

(1) Find the chromatic number (着色数) of the following graph.



(2) For which value of m and n does the complete bipartite graph $K_{m,n}$ have an

(a) Euler circuit?

(b) Euler path?

十二、（7 分）

Suppose that a planar graph has k connected components, e edges, and v vertices. Also suppose that the plane is divided into r regions by a planar representation of the graph.

Show that r=e-v+k+1. (即：证明 r=e-v+k+1)