华东师范大学期末试卷（B）

2007—2008 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、（6 分）

用一阶谓词公式描述下列命题的结构（使用全程个体域）

没有最大的自然数

二、（9 分）

设 C*是实数部分非零的全体复数组成的集合，C*上的关系 R 定义为：（a+bi）R(c+di) ⇔ac>0, 证明 R 是等价关系。

三、(10 分)

1. How many one-to-one functions are there from a set with *a* elements to one with *b* elements?

2. How many different strings can be made by reordering the letters of the word "MISSISSIPPI "?

四、（8 分）

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

五、（6 分，）

Use the binomial theorem

$$(x+y)^n = \sum_{k=0}^{n} C(n,k)x^{n-k}y^k$$

Let n be a nonnegative integer, then

$$\sum_{k=0}^{n}\binom{n}{k} = 2^n$$

六、（8 分）

What is the generation function for $\{a_k\}$, where a_k is the number of solutions of $x_1+x_2+x_3=k$, when x_1,x_2, and x_3 are integers with $x_1\geq 2$, $0\leq x_2\leq 3$, $2\leq x_3\leq 5$?

七、（6 分）

(a) Find a recurrence relation for the number of bit strings of length n that contain three consecutive 0s.

(b) What are the initial conditions?

八、（6 分） **Find the solution to $a_n=7a_{n-2}+6a_{n-3}$ with $a_0=9$, $a_1=10$, and $a_2=32$.**

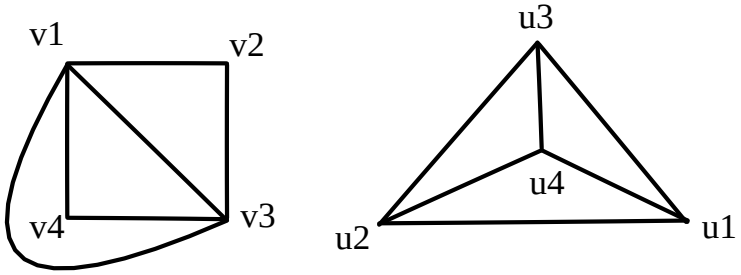
九、（6 分）**What is the general form of the particular solution of the linear nonhomogeneous recurrence relation $a_n=6a_{n-1}-12a_{n-2}+8a_{n-3}+F(n)$ if**
(a) $F(n)=n^3$? (b) $F(n)=(-2)^n$? (c) $F(n)=n^4 2^n$?

十、（20 分）

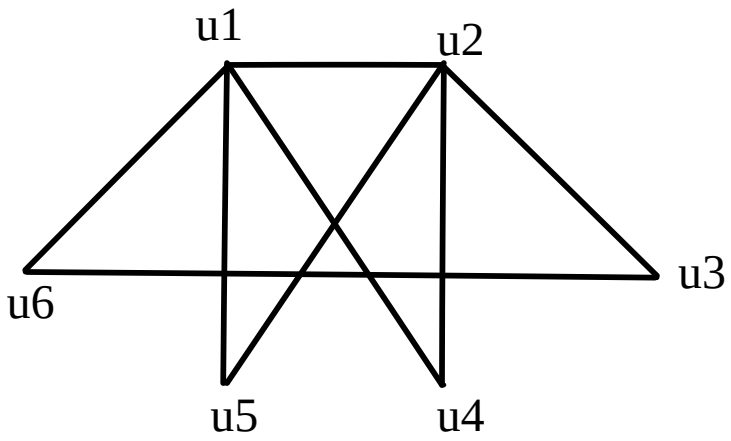
1. Does there exist a simple graph with six vertices of these degrees? If so, draw such a graph.

1, 2, 3, 4, 5, 6

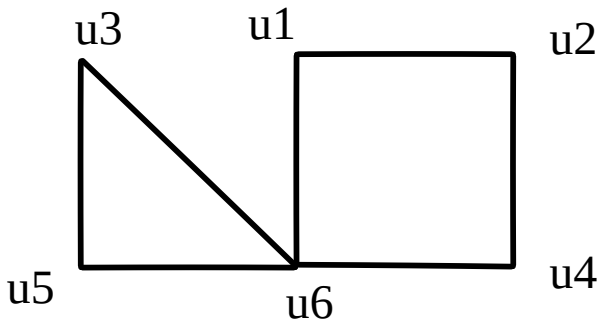
2. Determine whether the given pair of graphs is isomorphic(同构). Please briefly explain the reason.



3. **Determine whether the graph is bipartite.**



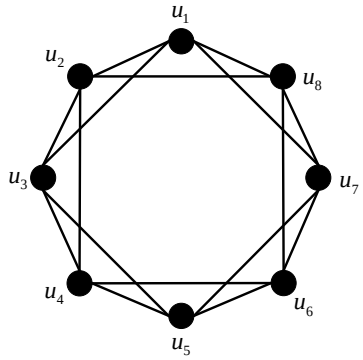
4. Find all the cut vertices of the given graph



十一、（**8** 分）

1. For which values of m **and** n **does the complete bipartite graph** $K_{m,n}$ **have a Hamilton circuit?**

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



十二、（7 分）

Prove the following graph is nonplanar (非平面).