华东师范大学期末试卷（A）

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、（7 分）

Show the following statement.

Premises: $\forall x(C(x) \rightarrow W(x) \wedge R(x))$, $\exists x(C(x) \wedge Q(x))$

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

二、（8 分，第 1 小题 5 分，第 2 小题 3 分）

Let A={1,2,3,…,9} and let R be the relation on A×A defined by

$$(a,b)R(c,d) \quad \text{if } a+d=b+c$$

(a) Prove that R is an equivalence relation.

(b) Find $[(2,5)]_R$, the equivalence class of (2,5).

三、(9 分)

How many strings of three decimal digits

(a) do not contain the same digit three times.

(b) begin with an odd digit?

(c) have exactly two digits that are 4s.

四、（6 分）

How many different strings can be made from the letters in *ABRACADABRA*, using all the letters.

五、（**10 分，每小题 5 分**）

How many solutions are there to the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 21$**，**

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

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

(b) $0 \leq x_1 \leq 10$**?**

六、（**10 分**）

Show that among any $n+1$ **positive integers not exceeding** $2n$ **there**

must be an integer that divides one of the other integers.

七、（**6 分**）

Proving using mathematical induction (数学归纳法) that

$$\sum_{j=2}^{n} C(j,2) = C(n+1,3)$$

wherever n **is an integer greater than 1.**

八、（**8 分，第 1 小题 5 分，第 2 小题 3 分**）

(a) Find a recurrence relation for the number of bit strings of length n **that do not contain three consecutive 0s. Please briefly explain the reason.**

(b) What are the initial conditions?

九、(**10 分**)

Find all solutions of the recurrence relation $a_n = 4a_{n-1} - 4a_{n-2} + 2^n$ **with**
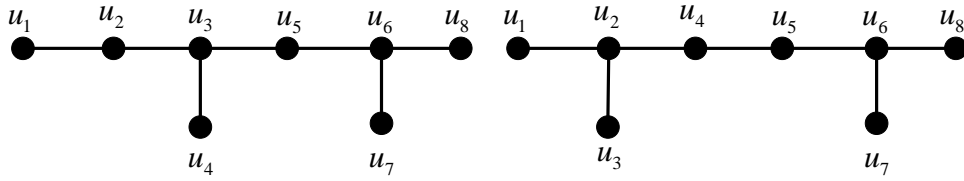
initial condition $a_0 = 1, a_1 = 2$

十、（**12 分，每小题 4 分**）

(a) Does there exist a simple graph with six vertices of these degrees? If so, draw such a graph.
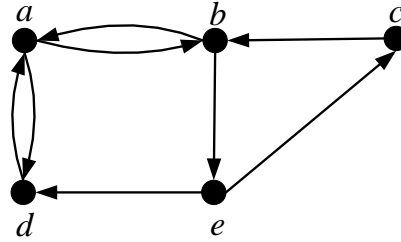
3, 2, 2, 2, 2, 3

(b) Determine whether the given pair of graphs is isomorphic(同构). Please briefly explain the reason.
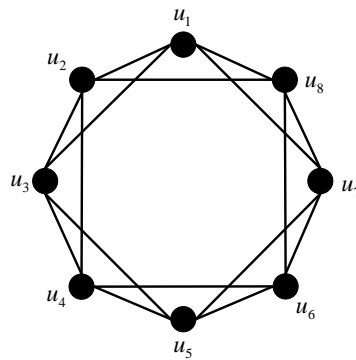
u_1 u_2 u_3 u_5 u_6 u_8 u_1 u_2 u_4 u_5 u_6 u_8

u_4 u_7 u_3 u_7

Fig(a)   **Fig(b)**

(c) Find the number of path between a **to** d **in the following graph of length 5.**

十一、(**7 分，第 1 小题 3 分，第 2 小题 4 分**)

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

(b) For which values of m **and** n **does the complete bipartite graph** $K_{m,n}$

have a Hamilton circuit?

十二、(**7 分**)

Prove the following graph is nonplanar (非平面).