北京邮电大学 2021—2022 学年第二学期

卷三:Discrete Mathematics–Midterm Test

考试注意事项	一、请将答案放置在试卷对应题目下，可以文本形式作答，也可粘贴图片（图片形式请裁剪得当）。 二、请在 2022 年 5 月 15 日星期日 12:00 前将发往指定邮箱 Bupt_2021@163.com，主题为《期中考试_姓名_学号》，附件为本答卷，文件名改为期中考试_姓名_学号.word。 三、学生作答试卷不得抄袭，如被发现，按相应规定严肃处理。

考试课程	离散数学				考试时间								
题号	一	二	三	四									总分
满分	25	25	25	25									
得分													
阅卷教师													

1. [25 points] The 5-tuples in a 5-ary relation represent these attributes of all people in the United States: name, Social Security number, street address, city, state.
   a) Determine a primary key for this relation.
   b) Under what conditions would (name, street address) be a composite key?
   c) Under what conditions would (name, street address, city) be a composite key?

2. [25 points] Complete the given table so that the binary operation * is associative.

*	a	b	c	d
a	b	a	c	d
b	b	a	c	d
c				
d	d	c	c	d

3. [25 points] Show that the (3, 7) encoding function e: $B^3 \rightarrow B^7$ defined by

e(000) = 0000000 e(100) = 1000101
e(001) = 0010110 e(101) = 1010011
e(010) = 0101000 e(110)= 1101101
e(011) = 0111110 e(111)= 1111011

is a group code.

4. [25 points] Find all solutions of the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2} + 2^n + 3n$. [Hint: Look for a particular solution of the form $qn2^n + p_1n + p_2$, where q, p_1, and p_2 are constants.]