

2.7

(1) 求下列关系表达式的值:

$$E_1 = \Pi_{C,D}(\sigma_{A>'a1' \wedge B<'b4'}(R))$$

$$E_2 = \Pi_{A,B,E,G}(\sigma_{A<'a3' \wedge E<'e3' \wedge G<>'g3'}(R \bowtie S \bowtie T))$$

$$E_3 = R \div \Pi_D(\sigma_{F='f1'}(T))$$

$$E_4 = \{t | ((\exists u)(\exists v)(\exists w)(R(t) \wedge S(v) \wedge T(w) \wedge u[3] > c1' \wedge v[2] <>'e2' \wedge w[3] <>'g2' \wedge u[4] = v[1] \wedge v[3] > w[2] \wedge t[1] = u[2] \wedge t[2] = u[3] \wedge t[3] = v[1] \wedge t[4] = w[3] \wedge t[5] = w[2]))\}$$

(2) 试将 E_4 转化为等价的关系代数表达式.

C	D
c ₂	d ₁
c ₂	d ₂
c ₂	d ₃
c ₂	d ₄
c ₃	d ₂

 E_1

A	B	E	G
a ₁	b ₁	e ₂	g ₁
a ₁	b ₂	e ₁	g ₂
a ₂	b ₂	e ₂	g ₁
a ₂	b ₃	e ₁	g ₂

 E_2

A	B	C
a ₁	b ₁	c ₁
a ₂	b ₂	c ₂
a ₂	b ₁	c ₂
a ₃	b ₂	c ₂
a ₄	b ₃	c ₂

 E_3

B	C	D	G	F
b ₃	c ₂	d ₂	g ₁	f ₁
b ₃	c ₂	d ₂	g ₃	f ₁
b ₂	c ₃	d ₂	g ₁	f ₁
b ₂	c ₃	d ₂	g ₃	f ₁
b ₄	c ₂	d ₂	g ₁	f ₁
b ₄	c ₂	d ₂	g ₃	f ₁

 E_4

$$E_4 = \Pi_{2,3,4,8,9}((\sigma_{C>'c1'}(R) \bowtie \sigma_{E \neq 'e2'}(S)) \times \sigma_{G \neq 'g2'}(T))$$

2.8

试用关系代数表达式写出在 Student, Course, SC 关系上进行的下列查询:

- 查询「计算机 07」班同学的学号和姓名;
- 学号为「01055107」的同学所选修的课程名称及成绩;
- 未选修编号为「CS-05」课程的学生学号;
- 选修了「张华」老师所开设课程的学生姓名、课程名称及成绩;
- 选修了全部课程的学生姓名及班级.

$$(1) \Pi_{S\#,Sname}(\sigma_{class='计算机 07'}(student))$$

$$(2) \Pi_{Cname,Grade}((\sigma_{S\#='01055107'}(SC)) \bowtie Course)$$

$$(3) \Pi_{S\#}(Student) - \Pi_{S\#}(\sigma_{C\#='CS-05'}(SC))$$

$$(4) \Pi_{Sname,Cname,Grade}((Student \bowtie SC) \bowtie \Pi_{C\#}(\sigma_{Teacher='张华'}(Course)))$$

$$(5) \Pi_{Sname,class}(Student \bowtie (\Pi_{C\#,S\#}(SC) \div \Pi_{C\#}(Course)))$$