Relational Algebra and SQL Practice Questions

User

Id	Name	Age	Gender	OccupationId	CityId
1	John	25	Male	1	3
2	Sara	20	Female	3	4
3	Victor	31	Male	2	5
4	Jane	27	Female	1	3

Occupation

OccupationId	OccupationName
1	Software Engineer
2	Accountant
3	Pharmacist
4	Library Assistant

City

CityId	CityName
1	Halifax
2	Calgary
3	Boston
4	New York
5	Toronto

1. Solve the following relational expressions for above relations.

- **a.** $P_{Name}(R_{Age>25}(User))$
- **b.** $R_{Id>2 \vee Age!=31}(User)$
- **c.** $R_{User.OccupationId=Occupation.OccupationId}(User \times Occupation)$
- **d.** $User \bowtie Occupation \bowtie City$
- **e.** $P_{Name,Gender}(R_{CityName=\text{"Boston"}}(User \bowtie City))$

2. Write SQL statements for relational expressions in question 1.

Answers

a. $P_{Name}(R_{Age>25}(User))$

Name
Victor
Jane

```
SELECT Name
FROM User
WHERE Age > 25;
```

b. $R_{Id>2 \vee Age!=31}(User)$

Id	Name	Age	Gender	OccupationId	CityId
1	John	25	Male	1	3
2	Sara	20	Female	3	4
3	Victor	31	Male	2	5
4	Jane	27	Female	1	3

```
SELECT *
FROM User
WHERE id>2 OR Age != 31;
```

c. $R_{User.OccupationId=Occupation.OccupationId}(User\ X\ Occupation)$

Id	Name	Age	Gender	OccupationId	CityId	OccupationId	OccupationName
1	John	25	Male	1	3	1	Software Engineer
2	Sara	20	Female	3	4	3	Pharmacist
3	Victor	31	Male	2	5	2	Accountant
4	Jane	27	Female	1	3	1	Software Engineer

```
SELECT *
FROM User u, Occupation o
WHERE u.OccupationId = o.OccupationId;
```

d. User ⋈ Occupation ⋈ City

CityId	OccupationId	Id	Name	Age	Gender	OccupationName	CityName
3	1	1	John	25	Male	Software Engineer	Boston
4	3	2	Sara	20	Female	Pharmacist	New York
5	2	3	Victor	31	Male	Accountant	Toronto
3	1	4	Jane	27	Female	Software Engineer	Boston

SELECT *
FROM User **NATURAL JOIN** Occupation **NATURAL JOIN** City;

e. $P_{Name,Gender}(R_{CityName="Boston"}(User \bowtie City))$

Name	Gender
John	Male
Jane	Female

SELECT Name**,** Gender
FROM User **NATURAL JOIN** City
WHERE CityName = ”Boston”;