1

1.1. Find the ID and name of each employee who works for "BigBank".

$$\prod_{id,name}\left(\sigma_{company\_name="BigBank"}\left(employee \bowtie_{employee.person\_name=works.person\_name}\right)\right)$$

1.2. Find the ID, name, and city of residence of each employee who works for "BigBank".

$$\prod_{id,name,city}\left(\sigma_{company\_name="BigBank"}\left(employee \bowtie_{employee.person\_name=works.person\_name}\right)\right)$$

1.3. Find the ID, name, street address, and city of residence of each employee who works for "BigBank" and earns more than $10000.

$$\prod_{id,name,street,city}\left(\sigma_{company\_name="BigBank" \wedge salary>10000}\left(employee \bowtie_{employee.person\_name=works.person\_name}\right)\right)$$

1.4. Find the ID and name of each employee in this database who lives in the same city as the company for which she or he works.

$$\prod_{id,name}\left(\sigma_{employee.city=company.city}\left(employee \bowtie_{employee.person\_name=works.person\_name} works \bowtie_{works.company\_name=company.company\_name} company\right)\right)$$

2

2.1. $\prod_{id,name}\left(\sigma_{company\_name\neq"BigBank"}\left(employee \bowtie_{employee.person\_name=works.person\_name}\right)\right)$

2.2. $\prod_{id,name}\left(\sigma_{max(salary)}\left(employee \bowtie_{employee.person\_name=works.person\_name}\right)\right)$

3. The insert case which can cause a violation is when we try to give the value which not exist in the department table to the "dept_name" attribute.

The delete case which can cause a violation is when we try to delete the value of primary key in the table of department, to which we have dependency in other, for example instructor, tables.

4.There is only one appropriate primary key in the table of employee, and it is "person_name".