1) Consider the employee database of figure below. Give an expression in the relational algebra to express each of the following queries:

employee (*person_name*, *street*, *city*)
works (*person_name*, *company_name*, *salary*)
company (*company_name*, *city*)

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

$\Pi_{ID,person\_name}\left(\sigma_{company\_name="BigBank"}(works)\right)$

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

$\Pi_{ID,person\_name,city}\left(\sigma_{company\_name="BigBank"}\left(\sigma_{employee.ID=works.ID}(employee \times works)\right)\right)$

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

$\Pi_{ID,person\_name,street,city}\left(\sigma_{company\_name="BigBank" \wedge salary > 10000}\left(\sigma_{employee.ID=works.ID}(employee \times works)\right)\right)$

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

$\Pi_{ID,person\_name}(\sigma_{employee.city=company.city}(employee \bowtie_{employee.ID=works.ID} works \bowtie_{works.company\_name=company.company\_name} company)))$

2)Consider the employee database of figure above. Give an expression in the relational algebra to express each of the following queries:

1. Find the ID and name of each employee who does not work for " BigBank".

$\Pi_{ID,person\_name}\left(\sigma_{company\_name\neg="BigBank"}(works)\right)$

2. Find the ID and name of each employee who earns at least as much as every employee in the database.

$\Pi_{\text{ID,person}\_name}(employee) - \Pi_{ID,person}\left(\rho_A(employee) \bowtie_{A.salary<B.salary} \rho_B(employee)\right)$

3)Consider the foreign-key constraint from the *dept_name* attribute of instructor to the *department* relation. Give examples of inserts and deletes to these relations that can cause a violation of the foreign-key constraint.

INSERT INTO instructor VALUES ('03085','Yerlan','Phys.Ed.','66666');

DELETE FROM department WHERE dept_name='Comp. Sci.';

4). Consider the employee database of figure above. What are the appropriate primary keys?

For employee we can choose **person_name**

For works we can choose **person_name**

For company we can choose **company_name**