Laboratory work 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)

Task 1

a) Find the ID and name of each employee who works for “BigBank”.

$$\Pi_{\text{id, person\_name}} (\sigma_{\text{company\_name} = \text{“BigBank”}}(\text{works}))$$

b) Find the ID, name, and city of residence of each employee who works for “BigBank”.

$$\Pi_{\text{id,person\_name,city}}(\sigma_{\text{company\_name}=\text{“BigBank”}}(\sigma_{\text{employee.id}=\text{works.id}} (\text{employee x works})))$$

c) Find the ID, name, street address, and city of residence of each employee who works for “BigBank” and earns more than $10000.

$$\Pi_{\text{id, person\_name, street, city}}(\sigma_{\text{company\_name} = \text{“BigBank”} \wedge \text{salary} > 10000}(\sigma_{\text{employee.id} = \text{works.id}} (\text{employee x works})))$$

d) 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.

$\prod_{id,person\_name}(\sigma_{employee.city=company.city}(\sigma_{works.company\_name = company.company\_name}(\sigma_{employee.id = works.id}(employee \times company \times works))))$

Task 2

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

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

$\prod_{id,person\_name}(\sigma_{company\_name \neq \text{“BigBank}}(works))$

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

$\prod_{id,person\_name}(\sigma_{salary >= avg(salary)}(\sigma_{employee.id = works.id}(employee \times works))$

Task 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.

Answer: The foreign-key makes a reference from one relation to another. If the object in the particular relation does not exists, then it is certainly a violation of foreign-key constraint.

Task 4

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

Employee: ID
Works: ID
Company: company_name