LAB2

Since there is no information about the ID field, I consider it to be a default POSTGRES field and a primary key for each table.
For some questions you'll see 2 answers; 1st would be the solution through cartesian product, 2nd - through JOIN operation.

1 PART:

a. employees_works←(employee$\bowtie_{\textbf{employee.person_name=works.person_name}}$works)

big_bank_employees←$\sigma_{\text{company\_name="BigBank"}}$(employees_works)

$\boldsymbol{\pi_{\text{employee.ID, employee.person\_name}}}$**(big_bank_employees)**

b. employees_works←(employee$\bowtie_{\textbf{employee.person_name=works.person_name}}$works)

big_bank_employees←$\sigma_{\text{company\_name="BigBank"}}$(employees_works)

$\boldsymbol{\pi_{\text{employee.ID, employee.person\_name, city}}}$**(big_bank_employees)**

c. employees_works←(employee$\bowtie_{\textbf{employee.person_name=works.person_name}}$works)

big_bank_employees←$\sigma_{\text{company\_name="BigBank"}}$(employees_works)

big_bank_rich_employees←$\sigma_{\text{salary>10000}}$(big_bank_employees)

$\boldsymbol{\pi_{\text{employee.ID, employee.person\_name, street, city}}}$**(big_bank_rich_employees)**

d. employees_works←(employee$\bowtie_{\textbf{employee.person_name=works.person_name}}$works)

employees_works_company ←
(employees_works$\bowtie_{\textbf{works.company_name=company.company_name}}$company)

employees_company_same_city ←
$\sigma_{\textbf{company.city=employee.city}}$(employees_works_company)

$\boldsymbol{\pi_{\text{employee.ID, employee.person\_name}}}$**(employees_company_same_city)**

2 PART:

a. employees_works←(employee$\bowtie_{\textbf{employee.person_name=works.person_name}}$works)

   not_big_bank_employees←$\sigma_{company\_name!=\text{"BigBank"}}$(employees_works)

   $\boldsymbol{\pi_{\text{employee.ID, employee.person\_name}}}$**(not_big_bank_employees)**

b. employees_works ←(employee$\bowtie_{\textbf{employee.person_name=works.person_name}}$works)

   employees_w_salary ←$\pi_{\text{employee.ID, employee.person\_name, works.salary}}$(employees_works)

   poorer_employees ← $\rho_{x(id,name,salary)}$employees_w_salary$\bowtie_{\textbf{salary<salary2(}}\rho_{x(id,name,salary2)}$employees_w_salary)

   max_salary_employees ←$\rho_{x(id,name,salary)}$employees_w_salary - poorer_employees

   $\boldsymbol{\pi_{\text{id,name,salary}}}$**(not_big_bank_employees)**

3 PART:

Given:

department(**dept_name**(PK), **building**, **budget**)
instructor(**ID**(PK), **name**, **dept_name**(FK), **salary**)

Insertion:

(123, ‘Argun’, ‘DepartmentOfCoolGuys’, 9999) on instructor table
If no department row with ‘DepartmentOfCoolGuys’ dept_name exists

Deletion:

(‘FIT’, ‘Tole-bi 59’, 9999) on department table
If any instructor with dept_name ‘FIT’ exists

4 PART:

employee - person_name(PK)
works - company_name(FK), person_name(FK), person_name and company_name(PK)
company - company_name(PK)