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1.

1) $\Pi_{ID, person_name} (\sigma_{company_name = "BigBank"} (works))$

SQL : SELECT id, person_name FROM works WHERE company_name = "BigBank";

2) $\Pi_{ID, person_name, city} (employee \bowtie_{employee.id=works.id} (\sigma_{company_name = "BigBank"} (works)))$

SQL : SELECT ID, Person_name, city FROM employee AS E, works AS W

WHERE E.id = W.id and W.company_name = "BigBank";

3) $\Pi_{ID, person_name, street, city} (\sigma_{(company_name = "BigBank" \wedge salary > 10000)} (works \bowtie_{employee.id=works.id} employee))$

SQL : SELECT ID, person_name, street, city FROM employee as E, works as W WHERE E.id = W.id and (W.company_name = "BigBank" and W.salary > 10000)

4) $\Pi_{ID, person_name} (\sigma_{employee.city=company.city} (employee \bowtie_{employee.ID=works.ID} works \bowtie_{works.company_name=company.company_name} company))$

SQL : SELECT ID, person_name FROM employee as E, works as W, company as C WHERE W.id = E.id and E.city = C.city and W.company_name = C.company_name

2.

1) $\Pi_{ID, person_name} (\sigma_{company_name \neq "BigBank"} (works))$

SQL : SELECT ID, person_name FROM works WHERE company_name != "BigBank";

2) $\Pi_{ID, person_name} (\sigma_{works.salary > MIN(works.salary)} (works \bowtie_{works.id = employee.id} employee))$

SQL : SELECT ID, person_name FROM employee as E, works as W WHERE W.salary > MIN(W.salary) and W.id = E.id;

3. We take that we don't have "KBTU PRIDE" department.

#1 And then if we insert such values as (001, Raymbek, KBTU PRIDE, 42500) we will have violation of the foreign key constraint.

#2 If we will try to delete some rows in department table that has dept_name = KBTU PRIDE, we will get violation of the foreign key constraint.

4. primary key = person_name