**Question # 1: Relational Algebra**

1)

π emp.emp\_id , emp.emp\_name, dept.dept\_name

(

σ dept.dept\_name = 'Sales'

(

σ emp.dept\_id = dept.dept\_id ( emp x dept)

)

)

2)

π emp.emp\_id , emp.emp\_name

(

σ proj.proj\_name = 'Project1'

(

σ emp.emp\_id = emp\_proj.emp\_id ∧ proj.proj\_id = emp\_proj.proj\_id

(

emp x emp\_proj x proj

)

)

)

3)

(π emp\_id, emp\_name (emp)) - (π emp\_id, emp\_name (emp ⨝ emp\_proj))

4)

π dept\_id, dept\_name

(

σ proj.budget > 75000 (emp ⨝ emp\_proj ⨝ proj ⨝ dept)

)

5)

π g sum(budget) (proj)

6)

π g max(emp\_salary) (emp ⨝ (σ dept\_name='Marketing' (dept)) )

7)

π g avg(emp\_salary) (emp ⨝ emp\_proj ⨝ proj ⨝ (σ dept\_name='Sales' (dept)) )

8)

π proj\_id, g count(proj\_id) (emp ⨝ emp\_proj)

**Question # 2: Relational Algebra and SQL**

1)

SELECT emp\_name FROM (SELECT \* FROM Departments NATURAL JOIN Employees)

NATURAL JOIN (SELECT \* FROM Departments WHERE dept\_name = 'SALES')

2)

SELECT emp\_name FROM Employees NATURAL JOIN Assignments

3)

SELECT emp\_name FROM Employees WHERE emp\_id NOT IN (SELECT emp\_id FROM Assignments);