

**Database Design, CSCI 340, Spring 2016**  
**Class exercise, Relational Algebra, March 2**

Consider the following tables:

EMP

Name	Office	Dept	Rank
Smith	400	CS	Assistant
Jones	220	Econ	Adjunct
Green	160	Econ	Assistant
Brown	420	CS	Associate
Smith	500	Fin	Associate

DEPART

Dept	MainOffice	Phone
CS	404	555-1212
Econ	200	555-1234
Fin	501	555-4321
Hist	100	555-9876

**What would be the output of the following expressions:**

1.  $\sigma_{\text{Rank} = \text{'Associate'}} (\sigma_{\text{Dept} = \text{'CS'}} \text{EMP})$

Answer:

Name	Office	Dept	Rank
Brown	420	CS	Associate

2.  $\sigma_{\text{Dept} = \text{'CS'}} (\sigma_{\text{Rank} = \text{'Associate'}} \text{EMP})$

Answer:

Name	Office	Dept	Rank
Brown	420	CS	Associate

3.  $\sigma_{\text{Rank} = \text{'Associate'} \vee \text{Dept} = \text{'CS'}} (\text{EMP})$

Answer:

Name	Office	Dept	Rank
Smith	400	CS	Assistant
Brown	420	CS	Associate
Smith	500	Fin	Associate

4.  $\sigma_{\neg (\text{Rank} = \text{'Adjunct'} \wedge \text{Dept} = \text{'CS'})} (\text{EMP})$

Answer:

Name	Office	Dept	Rank
Smith	400	CS	Assistant
Jones	220	Econ	Adjunct
Green	160	Econ	Assistant
Brown	420	CS	Associate
Smith	500	Fin	Associate

5.  $\pi_{\text{name}} (\sigma_{\text{Dept} = \text{'CS'}} (\text{EMP}))$

Answer:

Name
Smith
Brown

6.  $\pi_{\text{name, rank}} (\sigma_{\neg (\text{Rank} = \text{'Adjunct'} \wedge \text{Dept} = \text{'CS'})} (\text{EMP}))$

Answer:

Name	Rank
Smith	Assistant
Jones	Adjunct
Green	Assistant
Brown	Associate
Smith	Associate

7.  $\pi_{\text{name, rank}} (\sigma_{\text{office} > 300} (\pi_{\text{name, rank, office}} (\text{EMP})))$

Answer:

Name	Rank
Smith	Assistant
Brown	Associate
Smith	Associate

8. EMP  $\bowtie$  DEPART

Answer:

Name	Office	Dept	Rank	MainOffice	Phone
Smith	400	CS	Assistant	404	555-1212
Jones	220	Econ	Adjunct	200	555-1234
Green	160	Econ	Assistant	200	555-1234
Brown	420	CS	Associate	404	555-1212
Smith	500	Fin	Associate	501	555-4321

9. EMP  $\bowtie$ <sub>EMP.Dept = DEPART.Dept</sub> DEPART

Answer:

Name	Office	Dept	Rank	Dept	MainOffice	Phone
Smith	400	CS	Assistant	CS	404	555-1212
Jones	220	Econ	Adjunct	Econ	200	555-1234
Green	160	Econ	Assistant	Econ	200	555-1234
Brown	420	CS	Associate	CS	404	555-1212
Smith	500	Fin	Associate	Fin	501	555-4321

10. EMP  $\bowtie$ <sub>(EMP.office < DEPARTt.mainoffice)  $\wedge$  (EMP.dept = DEPART.dept)</sub> DEPART

Answer:

Name	Office	Dept	Rank	Dept	MainOffice	Phone
Smith	400	CS	Assistant	CS	404	555-1212
Green	160	Econ	Assistant	Econ	200	555-1234
Smith	500	Fin	Associate	Fin	501	555-4321