1.

$$\Pi_{Instr\_FName,\ Instr\_LName,\ Instr\_Phone}(INSTRUCTOR \bowtie CLASS \bowtie TRAINING)$$

2.

$$\Pi_{Emp\_ID,\ Emp\_FName,\ Emp\_LName}(\sigma_{Grade = 'R' \text{ AND } Sem\_Cmpltd = 'Spr\ 2020'}(EMPLOYEE \bowtie TRAINING)) \cup \Pi_{Emp\_ID,\ Emp\_FName,\ Emp\_LName}(\sigma_{Grade = 'R' \text{ AND } Sem\_Cmpltd = 'Fall\ 2020'}(EMPLOYEE \bowtie TRAINING))$$

3.

$$\Pi_{Emp\_ID,\ Emp\_FName,\ Emp\_LName}(\sigma_{Crs\_Title = 'Database\ Management' \text{ AND } Grade \neq 'R'}(EMPLOYEE \bowtie TRAINING \bowtie COURSE))$$

4.

$$\Pi_{Emp\_ID,\ Emp\_FName,\ Emp\_LName}(\sigma_{Grade = 'A+' \text{ AND } Grade = 'A' \text{ AND } Grade = 'A-' \text{ AND } (Sem\_Cmpltd = 'Spr\ 2020' \text{ OR } Sem\_Cmpltd = 'Fall\ 2020')}(EMPLOYEE \bowtie TRAINING))$$

$\pi_{Emp\_ID, Emp\_FName, Emp\_LName}$

$(\sigma_{Grade = 'R'}(EMPLOYEE \bowtie TRAINING))$

5. $\pi_{Instr\_ID, Instr\_FName, Inst\_LName}$

$(\sigma_{Crs\_Title = 'Internet\ Marketing'} - \sigma_{Crs\_Title = 'Marketing'}$

$(INSTRUCTOR \bowtie CLASS \bowtie COURSE))$

6. $\pi_{Emp\_ID, Emp\_FName, Emp\_LName, Crs\_Title, College\_Name}$

$(EMPLOYEE \supset\!\bowtie$

$\pi_{Emp\_ID, Crs\_Title, College\_Name}$

$(\sigma_{Sem\_Cmpltd = 'Spr\ 2020'\ OR\ Sem\_Cmpltd = 'Fall\ 2020'}$

$(COURSE \bowtie TRAINING))$

7. $\pi_{Crs\_ID, Crs\_Title, College\_Name}(COURSE)$

$-$

$\pi_{Crs\_ID, Crs\_Title, College\_Name}(COURSE \bowtie TRAINING)$

8. $(\pi_{Emp\_ID, Emp\_FName, Emp\_LName, College\_Name}(COURSE \bowtie TRAINING \bowtie EMPLOYEE)$

$\div$

$\pi_{College\_Name}(COURSE))$

$\bowtie \pi_{Emp\_ID, College\_Name}(COURSE \bowtie TRAINING)$

9. $\Pi_{Crs\_ID, Crs\_Title, Crs\_Type, Emp\_ID}$

$(\sigma_{Sem\_Cmpltd = 'Fall\ 2020'}(COURSE \bowtie TRAINING))$

$\bowtie$

$\Pi_{E1.Emp\_ID}$

$(\sigma_{E_1.SUPID = E_2.Emp\_ID\ AND\ E_3.Emp\_FName = 'Bill'\ AND\ E_2.Emp\_LName = 'Getz'}$

$(\rho_{E_1}(EMPLOYEE) \times \rho_{E_2}(EMPLOYEE)))$

$R \bowtie_F S = \sigma_F(R \times S)$

10. $\Pi_{E_1.Emp\_ID, E_1.Emp\_FName, E_1.Emp\_LName, E_2.Emp\_ID, E_3.Emp\_FName, E_3.Emp\_LName}$

$E_1.Crs\_Title, E_1.Sem\_Cmpltd$

$(\sigma_{E_1.Crs\_ID = E_3.Crs\_ID\ AND\ E_1.Sem\_Cmpltd = E_3.Sem\_Cmpltd}$

$AND\ E_1.Crs\_ID < E_2.Crs\_ID$

$(\rho_{E_1}((EMPLOYEE \bowtie TRAINING) \bowtie COURSE)$

$\times \rho_{E_2}((EMPLOYEE \bowtie TRAINING) \bowtie COURSE)))$

! only two table in one join