# B561 Advanced Database Concepts
# Assignment 2 4a-9 Solutions
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**4a)** Let Q and Q2 be as the following

$$\pi_{pid}((\pi_{pid,cname,salary}(W) - (\pi_{pid,cname,salary}(W1 \bowtie_{W1.pid \neq W2.pid \wedge W1.cname=W2.cname \wedge W1.salary > W2.salary} (W2))))$$

$$\pi_{pid}(Q) \cap \pi_{pid1}(K \bowtie_{pid2=pid} \pi_{pid}(\sigma_{skill=OperatingSystems}(pS)))$$

Then the answer is:

$$\pi_{cname,pid,salary}(P \bowtie W \bowtie Q2)$$

**5a)**

$$\pi_{pname,salary,city}(\pi_{pname,salary,cname,city}(P1 \bowtie W1)$$

$$-$$

$$(\pi_{pname,salary,cname,city}(P1 \bowtie W1 \bowtie (\sigma_{skill= Networks}(pS)) \bowtie_{P1.city=P2.city \wedge P2.pid=pS.pid} (P2)))$$

$$-$$

$$(\pi_{pname,W1.salary,cname,city}(P1 \bowtie W1 \bowtie_{w1.cname=w2.cname \wedge w1.salary < w2.salary} (W2))))$$

**6a)** Let P and CH be as the following:

$$\pi_{pid}(\sigma_{city="Chicago"}(P))$$

$$\pi_{cname}(P \bowtie W)$$

Then let Q1 and Q2 be as the following:

$$\pi_{cname}(C1) - \pi_{cname}(CH1)$$

$$\pi_{cname}(C2) - \pi_{cname}(CH2)$$

Then the answer is:

$$\pi_{Q1.cname,Q2.cname}(Q1 \bowtie_{Q1.cname \neq Q2.cname} (Q2))$$

**7)**

$$\pi_{hm.mid,hm.eid}(HM) - \pi_{k.pid1,k.pid2}(K) = \varnothing$$

**8)**

$$\pi_{W.pid(\sigma_{W.cname=`Amazon'}(W)} - \pi_{K1.pid1}(K1 \bowtie_{K1.pid1=K2.pid1 \wedge K1.pid2 \neq K2.pid2} K2 \bowtie_{K2.pid1=K3.pid1 \wedge K2.pid2 \neq K3.pid2 \wedge K1.pid2 \neq K3.pid2} K3) = \varnothing$$

**9)**

$$PersonWithNoSkill = A = \pi_{p.pid}(P) - \pi_{ps.pid}(PS)$$
$$PersonWithNoSkillSalary = B = \pi_{w.salary}(W \bowtie_{w.pid=A.pid} (A))$$

The answer is:

$$\pi_{W.pid}(W \bowtie_{w.salary<B.salary} (B) \bowtie_{w.cname=c.cname} (\sigma_{c.headquarter=`Cupertino'}(C)) \neq \emptyset$$