1. 1) π_{gname} (Guest $\bowtie$ ($\sigma_{fromDate >= 'Jan01'}$ $\wedge$ $\sigma_{fromDate <= 'Jan 31'}$ $\wedge$ $\sigma_{year = '2019'}$

(Booking)) $\bowtie$ ($\sigma_{hcity = 'NYC'}$ (Hotel)))

2) π_{gname} (Guest $\bowtie$ ($\sigma_{noOfDays > 10}$ (Booking)) $\bowtie$ ($\sigma_{type = 'suite'}$ (Room)) $\bowtie$

($\sigma_{hcity = 'NYC'}$ (Hotel)))

3) ρ (lessFive , π_{gId} ($\sigma_{noOfDays <= 5}$ (Booking)))

ρ (greaterFive , π_{gId} ($\sigma_{noOfDays > 5}$ (Booking)))

π_{gname} (Guest $\bowtie$ (lessFive - greaterFive))

4) ρ (allB, π_{hId} (Booking))

ρ (yesB, π_{hId} ($\sigma_{year = '2018'}$ (Booking)))

ρ (hType, π_{hId} ($\sigma_{hcity = 'NYC'}$ (Hotel)))

π_{hId} ((allB - yesB) $\bowtie$ hType)

5) ρ (rooms , $\pi_{gId, hId}$ ($\sigma_{type = 'suite'}$ (Booking $\bowtie$ Room)))

ρ (hotelsNYC , π_{hId} ($\sigma_{hcity = 'NYC'}$ (Hotel)))

π_{gId} (rooms / hotelsNYC)

2. 1) SELECT E.ename , E.age

FROM   Emp E, Dept D, Works W

WHERE D.dname = 'Hardware' AND E.eid = W.eid AND W.did = D.did

INTERSECT

SELECT E.ename , E.age

FROM   EMP E , Dept D, Works W

WHERE D.dname = 'Software' AND E.eid = W.eid AND W.did = D.did

2. 2) SELECT D.managerid
    FROM   Dept D
    GROUP BY D.managerid
    HAVING SUM (Budget) >= ALL (SELECT SUM (D1.budget)
                                 FROM   Dept D1
                                 GROUP BY D1.managerid)

3) SELECT D.managerid
   FROM   Dept D
   WHERE D.managerid NOT IN (SELECT D1. managerid
                                FROM   Dept D1
                                WHERE   D1.budget < 1000000)

4) SELECT E.ename
   FROM   Emp E
   WHERE   E.salary >= ALL (SELECT D.budget
                             FROM Dept D NJ Works W
                             WHERE   E.eid = W.eid)

5) SELECT E. ename
   FROM   Emp E, Dept D
   WHERE E.eid = D.managerid AND D.budget = (SELECT MAX (D1.budget)
                                                 FROM Dept D1)

3. 1) a) $\pi_{id, address, asking\text{-}price, selling\text{-}price}$ ($\sigma_{asking\text{-}price > selling\text{-}price}$ (House $\bowtie$ Sold))

    b) ρ (hsold , $\pi_{name, id}$ (Buyer $\bowtie_{buyer.id = Sold. buyer\text{-}id}$ (Sold)))
        π_{name} (($\pi_{name, id}$ (Buyer)) - hsold)

3. 2) a)
```
SELECT  H.postal_code , AVG (s.selling-price) AS avg-price
FROM    House H, Sold S
WHERE   H.id = S.house_id
GROUP BY H.postal_code
HAVING  COUNT (#) >= 3
```

b)
```
SELECT DISTINCT (H.address , H.asking.price)
FROM    House H
WHERE   H.beds >= 4 AND H.baths >=2 AND NOT EXISTS ( SELECT  *
                                                     FROM   Sold S
                                                     WHERE  H.id=S.house-id)
```

I pledge my honor that I have abided by the Stevens Honor System. -Eu _____