EECS 341 Assignment #5 Keys; Spring'2009

Consider the Customers-Agents-Products (CAP) database with schema below.

CUSTOMERS (cid, cname, city, discnt) AGENTS (aid, aname, city, percent)
PRODUCTS (pid, pname, city, quantity, price) ORDERS (ordno, month, cid, aid, pid, qty, dollars)

Write in SQL the queries listed below.

Q1: Get names of products that are ordered by at least one customer three different times.

```
SELECT DISTINCT P.pname
FROM PRODUCTS P, ORDERS O1, ORDERS O2, ORDERS O3, CUSTOMERS C
WHERE O1.pid=P.pid   AND O2.pid=P.pid AND O3.pid=P.pid AND
        O1.cid=C.cid   AND  O2.cid=c.cid AND O3.cid=C.cid AND
        O3.ordno<>O2.ordno   AND   O3.ordno<>O1.ordno  AND   O1.ordno<>O2.ordno
```

Q2: Get names of products that are ordered by at least three customers in the same city.

```
SELECT DISTINCT P.pname
FROM PRODUCTS P, ORDERS O1, ORDERS O2, ORDERS O3, CUSTOMERS C1,  CUSTOMERS C2, CUSTOMERS C3
WHERE O1.pid=P.pid AND O2.pid=P.pid AND O3.pid=P.pid AND
        O1.cid=C1.cid AND O2.cid=C2.cid AND O3.cid=C3.cid AND
        C1.city=C2.city AND C2.city=C3.city AND
        C1.cid<>C2.cid AND C1.cid<>C3.cid AND C2.cid<>C3.cid
```

Q3: Get names of products that are ordered by at least one customer in each and every city listed in the database (**difficult query**).

Rewritten: get products for which the number of distinct customer cities it is ordered from is equal to the number of distinct customer cities.

```
SELECT   P.pname
FROM   PRODUCTS P
WHERE   (SELECT COUNT(T1.city) FROM ((SELECT DISTINCT city FROM CUSTOMERS)
                                        UNION (SELECT DISTINCT city FROM PRODUCTS)
                                        UNION (SELECT DISTINCT city FROM AGENTS)) AS T1)
= (SELECT COUNT(*)
    FROM    (SELECT DISTINCT city FROM CUSTOMERS C, ORDERS O
              WHERE O.cid=C.cid AND O.pid=P.pid) AS T2)
```

INCORRECT QUERY ANSWER:

Rewritten: Get names of products where there does not exist a city from which a customer did not order it.

```
SELECT P.pname
FROM PRODUCTS P
WHERE NOT EXISTS (SELECT C.city
                  FROM CUSTOMERS C
                  WHERE NOT EXISTS (SELECT O.ordno
                                    FROM ORDERS O
                                    WHERE O.cid=C.cid AND O.pid=P.pid ) )
```

But, the above query implements: Get products ordered by all customers!!!

Q4: Get names of products that are never ordered by any customer in Tokyo or Cleveland.

```
SELECT P.pname
FROM PRODUCTS P
WHERE NOT EXISTS (SELECT *
                  FROM CUSTOMERS C, ORDERS O
                  WHERE O.cid=C.cid AND O.pid=P.pid AND
                        (C.city='Cleveland'  OR C.city='Tokyo') )
```

Q5: Get names of products produced in Cleveland or Paris, and ordered through agent a012 or a013.

```
SELECT DISTINCT P.pname
FROM PRODUCTS P, ORDERS O
WHERE (P.city="Cleveland" OR P.city="Paris")  AND O.pid=P.pid AND (O.aid="a012"  OR  O.aid="a013")
```

Q6: Get order numbers of products that are priced at $1M or above, and ordered by customers who have 20% and above discounts, and ordered via agents with percentage commissions above 10%.

```
SELECT O.ordno
FROM ORDERS O, PRODUCTS P, CUSTOMERS C, AGENTS A
WHERE O.pid=P.pid AND O.cid=C.cid AND  O.aid=A.aid  AND P.price ≥ "1,000,000" AND C.discnt ≥ ".20" AND A.percent >".10"
```

Q7: Get names of customers who have always ordered in dollar amounts more than $1,000,000, and never through agents in New York.

```
SELECT C.cname
FROM CUSTOMERS C
WHERE NOT  EXISTS (SELECT *
                   FROM ORDERS O, AGENTS A
                   WHERE O.cid=C.cid AND O.aid=A.aid AND (O.dollars ≤ "1,000,000" OR A.city ="New York")
```

Q8: Get names of agents whose commissions are always below 10%, and never ordered products with prices less than $100,000.

```
SELECT A.aname
FROM    AGENTS A
WHERE A.percent <".10" AND NOT EXISTS (SELECT *
                                       FROM ORDERS O, PRODUCTS P
                                       WHERE O.aid=A.aid AND O.pid=P.pid AND P.price < "100,000")
```