1. Translate the following SQL statements into relational algebra

a) SELECT DISTINCT customers.customer_id, customers.customer_name FROM customers INNER JOIN orders ON customers.customer_id = orders.customer_id

b) SELECT customers.* FROM customers LEFT JOIN orders ON customers.customer_id = orders.customer_id WHERE orders.customer_id IS NULL

c) SELECT customer_state As state, COUNT(customer_id) As total FROM customers WHERE customer_state IN('MA', 'CA') GROUP BY customer_state

d) SELECT customer_state, COUNT(customer_id) As total FROM customers GROUP BY customer_state

e) SELECT COUNT(DISTINCT customer_state) AS total FROM customers

f) SELECT count(customer_state) FROM (SELECT DISTINCT customer_state FROM customers);

g) SELECT customer_id, customer_name, COUNT(order_id) as total FROM customers INNER JOIN orders ON customers.customer_id = orders.customer_id GROUP BY customer_id, customer_name ORDER BY COUNT(order_id)

h) SELECT COUNT(store_name)
FROM Store_Information

i) SELECT SSN

FROM EMPLOYEE;

j) SELECT DISTINCT ESSN

FROM WORKS_ON
WHERE (Pno, Hours) IN (SELECT Pno, Hours
FROM WORKS_ON
WHERE SSN=’123456’);

k) SELECT Fname, Address

FROM (EMP JOIN DEPT ON Dno=Dnumber)
WHERE Dname=’Research’;

l) SELECT Pnumber, Dnum, Lname

FROM ((PROJ JOIN DEPT ON Dnum=Dnumber) JOIN EMPLOYEE ON MgrSSN=SSN)
WHERE Ploc=’Delhi’;

m) SELECT Pnumber, Pname

FROM PROJ, WORKS_ON
WHERE Pnumber=Pno
GROUP BY Pnumber;