Sample final solution

Question 1

a) true, b) false, c) false, d) true, e) false, f) true, g) false

Question 2

a) CREATE VIEW Service-History AS
SELECT make, model, COUNT(*) AS srv-freq, AVG(charge) AS avg-charge
FROM vehicles v, services s
WHERE v.vtype=s.vtype
GROUP BY make, model

b) SELECT make, model
FROM Service-History
WHERE srv_freq <= ALL (SELECT srv-freq FROM Service-History)

c) SELECT make, SUM(srv-freq)
FROM Service-History
GROUP BY make

d) SELECT srv-type
FROM services
MINUS
SELECT srv-type
FROM services
WHERE charge > 100

e) SELECT make, model, srv-type
FROM services s1, vehicles v1
WHERE s1.vtype=v1.vtype
GROUP BY make, model, srv-type
HAVING COUNT(*) >= ALL (SELECT COUNT(*)
FROM services s2, vehicles v2
WHERE s2.vtype=v2.vtype AND
s2.make=s1.make AND s2.model=s1.model
GROUP BY s2.srv-type)

Question 3

a) List of service types performed in January 1999.
b) Make, model and year of vehicles where no vehicle of that type is serviced since Jan 2000.

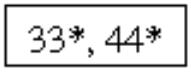
Question 4

a) First, ABC is a super key because $(ABC)^+$ = ABCDE. Second, ABC is minimal because $(AB)^+$ = ABD != ABCDE and …
b) ABC is the only key because …
c) No. A violation: AB→D but (AB)+ = ABD != ABCDE
d) No. A violation: AB→D but AB is not a superkey (as shown in c) and D is not part of any of the keys (keys are found in a and b).
e) First, break R into R1(A,B,D), R2(A,B,C,E) to resolve the violation AB→D. Then break R2 into R21(B,C,E) and R22(A,B,C) to resolve the violation BC→E.

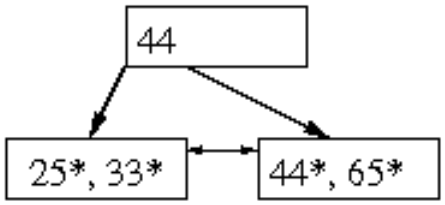
Question 5

Sample final solution

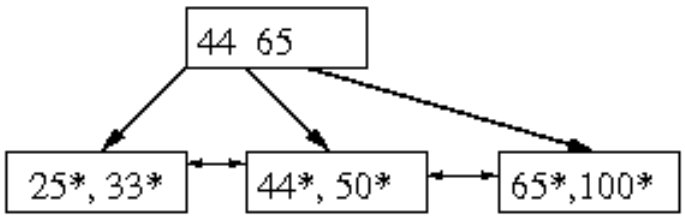
a)



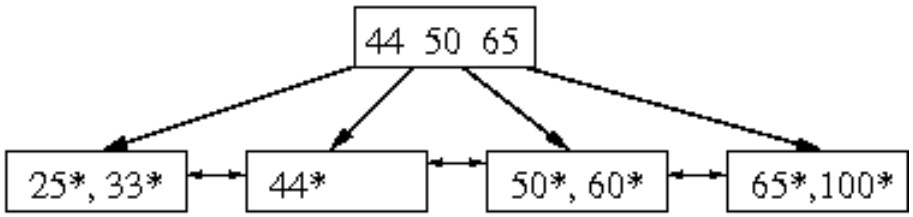
b)



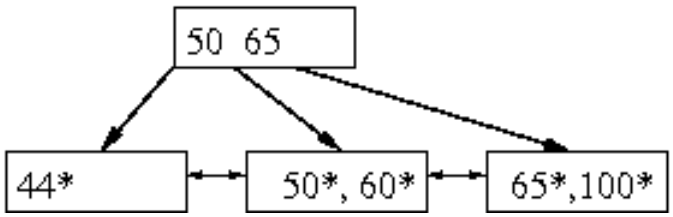
c)



d)

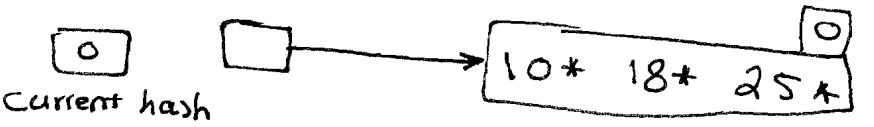


e) delete 25*, 33*

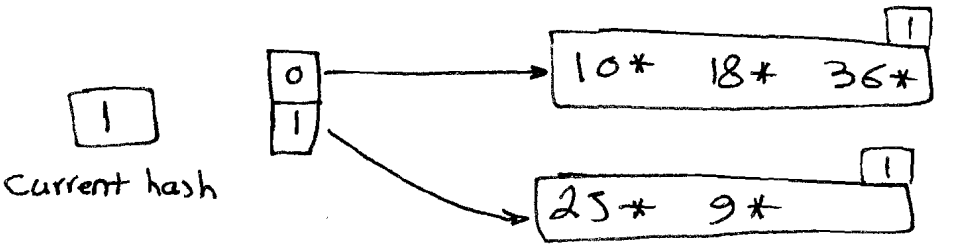


Question 6

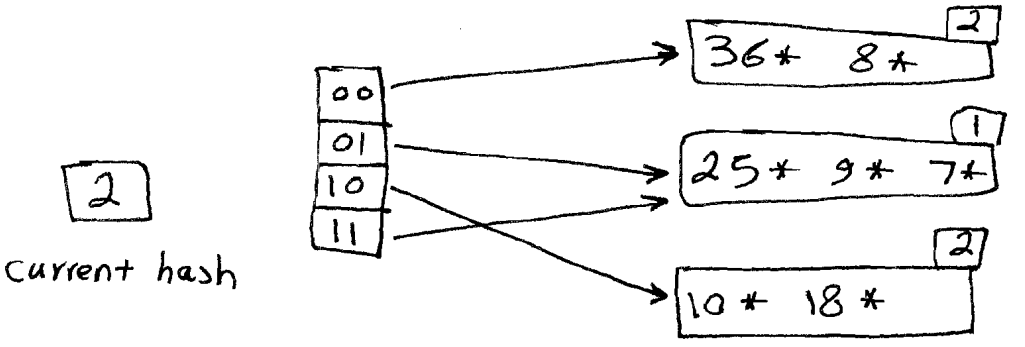
a)



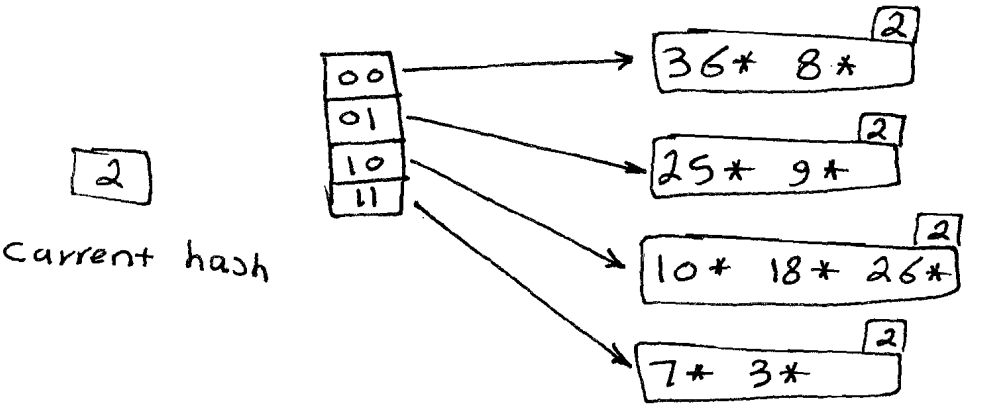
b)



c)



d)



e)