Xie Zhou 912143385

ECS165 HW3

1a)

R(city) := πcity(Car)

R:

|  |
| --- |
| City |
| 33 |
| 38 |
| 30 |
| 40 |

1b)

R(city) := πcity(Car)

R:

|  |
| --- |
| City |
| 33 |
| 38 |
| 30 |
| 33 |
| 40 |
| 30 |
| 33 |

1c)

AVG(city)

= (33+38+30+40)/4

= 35.25

1d)

AVG(city)

= (33+38+30+33+40+30+33)/7

≈ 33.8571429

≈ 33.86

2)

As Prof. Nitta said on piazza, do full outer join.

Car ⟗ Product:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| model | city | highway | msrp | maker | year |
| 1001 | 33 | 36 | 26000 | A | 2011 |
| 1002 | 38 | 43 | 27600 | A | 2015 |
| 2001 | 33 | 38 | 23000 | B | 2014 |
| 3001 | 30 | 34 | 23000 | C | 2007 |
| 1003 | 30 | 34 | 22500 | ⟂ | ⟂ |
| 2002 | 40 | 42 | 33200 | ⟂ | ⟂ |
| 3002 | 33 | 36 | 25600 | ⟂ | ⟂ |
| 1101 | ⟂ | ⟂ | ⟂ | A | 2014 |
| 2003 | ⟂ | ⟂ | ⟂ | B | 1999 |
| 2101 | ⟂ | ⟂ | ⟂ | B | 2005 |
| 2102 | ⟂ | ⟂ | ⟂ | B | 2011 |
| 2201 | ⟂ | ⟂ | ⟂ | B | 2007 |
| 3201 | ⟂ | ⟂ | ⟂ | C | 2016 |

3a)

Ans(model) <--- EV(model, range, \_\_ , \_\_ , \_\_ ) AND range < 35

3b)

Ans(model) <--- Pickup(model, \_\_ , highway, \_\_ , cargo, \_\_ , \_\_)

AND cargo ≥ 75 AND highway < 25

3c)

V(model, msrp) <--- Car(model, \_\_ , \_\_ , \_\_ , \_\_ , \_\_ , msrp)

V(model, msrp) <--- Pickip(model, \_\_ , \_\_ , \_\_ , \_\_ , \_\_ , msrp)

V(model, msrp) <--- EV(model, \_\_ , \_\_ , \_\_ , msrp)

Ans(maker) <--- Product(maker, model, \_\_) AND Product(maker,model2)

AND V(model, msrp) AND V(model2, msrp2)

AND model ≠ model2 AND msrp < 25000 AND msrp2 > 60000

3d)

V(m, p) <--- Car(m, \_\_ , \_\_ , \_\_ , p, \_\_ , \_\_)

V(m, p) <--- Pickup(m, \_\_ , \_\_ , p, \_\_ , \_\_ , \_\_)

V(m, p) <--- EV(m, \_\_ , \_\_ p, \_\_ )

Ans(p) <--- V(m1, p1) AND V(m2, p2) AND m1 ≠ m2 AND p1 = p2

3e)

CV(m, c, h) <--- Car(m, c, h, \_\_ , \_\_ , \_\_ , \_\_ )

CV(m, c, h) <--- Pickup(m, c, h, \_\_ , \_\_ , \_\_ , \_\_ )

Low(m1) <--- CV(m1, c1, h1) AND CV(m2, c2, h2)

AND m1 ≠ m2 AND c1\*0.55+h1\*0.45 < c2\*0.55+h2\*0.45

High(m) <--- CV(m, \_\_ , \_\_) AND NOT Low(m)

Ans(maker) <--- High(m) AND Product(maker, m, \_\_ )

3f)

CV(m, c, h) <--- Car(m, c, h, \_\_ , \_\_ , \_\_ , \_\_ )

CV(m, c, h) <--- Pickup(m, c, h, \_\_ , \_\_ , \_\_ , \_\_ )

EEV(m, r, b) <--- EV(m, r, b, \_\_ , \_\_)

LowCV(m1, c1, h1) <--- CV(m1, c1, h1) AND CV(m2, c2, h2)

AND m1 ≠ m2 AND 0.55\*c1+0.45\*h1 < 0.55\*c2+0.45\*h2

HighCV(m, c, h) <--- CV(m, c, h) AND NOT LowCV(m, c, h)

LowEV(m1, r1, b1) <--- EEV(m1, r1, b1) AND EEV(m2, r2, b2)

AND m1 ≠ m2 AND r1/(b1/33.1) < r2/(b2/33.1)

HighEV(m, r, b) <--- EEV(m, r, b) AND NOT LowEV(m, r, b)

Low\_HighCV(m1) <--- HighCV(m1, c, h) AND (m2, r, b)

AND m1 ≠ m2 AND 0.55\*c+0.45\*h < r/(b/33.1)

Low\_HighEV(m1) <--- HighCV(m1, c, h) AND (m2, r, b)

AND m1 ≠ m2 AND r/(b/33.1) < 0.55\*c+0.45\*h

Ans(m) <--- HighCV(m, \_\_ , \_\_ ) AND NOT Low\_HighCV (m)

Ans(m) <--- HighEV(m, \_\_ , \_\_ ) AND NOT Low\_HighEV (m)

3g)

HighCar(maker,model1) <--- Product(maker,model1, \_\_ )

AND Product(maker, model2, \_\_ )

AND Car(model1, city1, \_\_ , \_\_ , \_\_ , \_\_ , \_\_)

AND Car(model2, city2, \_\_ , \_\_ , \_\_ , \_\_ , \_\_)

AND city1 > city2

LowCar(maker, model) <--- Product(maker, model, \_\_ )

AND Car(model, \_\_ , \_\_ , \_\_ , \_\_ , \_\_)

AND NOT HighCar(maker, model)

Ans(maker) <--- AND LowCar(maker, model1) AND Car(model1, c1, \_\_ , \_\_ , \_\_ , \_\_ , \_\_)

AND Product(maker, model2)

AND Pickup(model2, c2, \_\_ , \_\_ , \_\_ , \_\_ , \_\_ ) AND c1 > c2

3h)

CV(maker, msrp) <--- Product(maker, model, \_\_ )

AND Car(model, \_\_ , \_\_ , \_\_ , \_\_ , \_\_ , msrp)

CV(maker, msrp) <--- Product(maker, model, \_\_ )

AND Pickup(model, \_\_ , \_\_ , \_\_ , \_\_ , \_\_ , msrp)

Ans(maker) <--- CV(maker, msrp1)

AND CV(maker, msrp2)

AND CV(maker, msrp3)

msrp1 < msrp2 AND msrp2 < msrp3

4a)

SELECT DISTINCT model

FROM EV

WHERE range < 35

4b)

SELECT DISTINCT model

FROM Pickup

WHERE cargo >= 75 AND highway < 25

4c)

SELECT DISTINCT J1.maker FROM

(SELECT maker, msrp

FROM Product NATURAL JOIN

(SELECT model, msrp FROM Car

UNION

SELECT model, msrp FROM Pickup

UNION

SELECT model, msrp FROM EV) AS S

)AS J1,

(SELECT maker, msrp

FROM Product NATURAL JOIN

(SELECT model, msrp FROM Car

UNION

SELECT model, msrp FROM Pickup

UNION

SELECT model, msrp FROM EV) AS S

)AS J2

WHERE J1.maker = J2.maker AND J1.msrp < 25000 AND J2.msrp > 60000;

4d)

SELECT DISTINCT J1.passengers FROM

(SELECT model, passengers FROM Car

UNION

SELECT model, passengers FROM Pickup

UNION

SELECT model, passengers FROM EV )AS J1,

(SELECT model, passengers FROM Car

UNION

SELECT model, passengers FROM Pickup

UNION

SELECT model, passengers FROM EV )AS J2

WHERE J1.model <> J2.model AND J1.passengers = J2.passengers;

4e)

SELECT DISTINCT maker

FROM Product NATURAL JOIN

(

(SELECT model FROM CAR

UNION

SELECT model FROM Pickup)

EXCEPT

(SELECT J1.model FROM

(SELECT model, city, highway FROM CAR

UNION

SELECT model, city, highway FROM Pickup)AS J1,

(SELECT model, city, highway FROM CAR

UNION

SELECT model, city, highway FROM Pickup)AS J2

WHERE J1.model <> J2.model

AND J1.city\*0.55+J1.highway\*0.45 < J2.city\*0.55+J2.highway\*0.45)

)AS F;

4f)

SELECT model FROM Car

UNION

SELECT model FROM Pickup

UNION

SELECT model FROM EV

EXCEPT

SELECT J1.model FROM

(SELECT model, 0.55\*city+0.45\*highway AS fuel

FROM (Car NATURAL JOIN Product)

UNION

SELECT model, 0.55\*city+0.45\*highway AS fuel

FROM (Pickup NATURAL JOIN Product)

UNION

SELECT model, range/(battery/33.1) AS fuel

FROM (EV NATURAL JOIN Product)) AS J1,

(SELECT model, 0.55\*city+0.45\*highway AS fuel

FROM (Car NATURAL JOIN Product)

UNION

SELECT model, 0.55\*city+0.45\*highway AS fuel

FROM (Pickup NATURAL JOIN Product)

UNION

SELECT model, range/(battery/33.1) AS fuel

FROM (EV NATURAL JOIN Product)) AS J2

WHERE J1.fuel < J2.fuel;

4g)

SELECT DISTINCT LOWCAR.maker FROM

(

(SELECT maker, model,city

FROM Product NATURAL JOIN

(SELECT model, city FROM Car)AS A

EXCEPT

SELECT J1.maker, J1.model, J1.city FROM

(SELECT maker, model, city

FROM Product NATURAL JOIN

(SELECT model, city FROM Car) AS Q

)AS J1,

(SELECT maker, model,city

FROM Product NATURAL JOIN

(SELECT model, city FROM Car)AS P

)AS J2

WHERE J1.city > J2.city

)

) AS LOWCAR,

(Product NATURAL JOIN Pickup)AS P

WHERE LOWCAR.city > P.city;

4h)

SELECT DISTINCT J1.maker FROM

(SELECT maker, msrp FROM (Product NATURAL JOIN Car)

UNION

SELECT maker, msrp FROM (Product NATURAL JOIN Pickup)

) AS J1,

(SELECT maker, msrp FROM (Product NATURAL JOIN Car)

UNION

SELECT maker, msrp FROM (Product NATURAL JOIN Pickup)

) AS J2,

(SELECT maker, msrp FROM (Product NATURAL JOIN Car)

UNION

SELECT maker, msrp FROM (Product NATURAL JOIN Pickup)

) AS J3

WHERE J1.msrp < J2.msrp AND J2.msrp < J3.msrp AND J1.maker = J2.maker AND J2.maker = J3.maker;