Columns= affisbutes couch row = tuple, record earch cell is atomic, no list, no object in the cell. - Case insensitive, however 'Seatile' + 'seattle' labe' / "abe" X Select DISTINICT eliminates duplicates electionics and toy category, china without

Intersect

wher country = 'china' and

category = 'toy' and

chance = many

chance = many

(company new)

(company new)

(company new) Likes (drinber, beer) Frequents (drinber, bor) Serves (Bor, beer) - For each her, count # of drinkers that are freq. to that have and that like both 'heinehen' and 'bud! Select x.bor, count (distinct x-drinker) freq X, likes y, likes 2 x. drinker = y drinker and x. drinker - 2 drinker and for mere y heer = 'hein' and } heer = 'bud' Blook ph x.por

each bor that serve both 'heir' and 'bud', count thof drinkers that are frog. to bor. Select x bor, count (distinct x drinkers) from frequents x, serves y, serves 2 where x.bor = y her end x-por = 3.por and y hear = 'han' and 2 beer = bud group by x.por - For each har that surve 'hun', count # of drinkers that freg- to her end like Select x.bor, count (distinct x.drinkers) "bud! from frequents x, serve y, likes 2 where x.bar = y.bar, and x drinher = 2 drinher and y heer = heun' and 2 hear = 1 bud! scoup put x-pac - Find all drinkers that are freq to some her that serves some heer that they like hix drinkers from frequents x , serves y, likes z where x, drinkers = 2, drinkers and x.bor = y.bor and y heer = 2 heer

art drinbers that frequent only bors that serve some heer that they If a bor doos not sell any heer that drinker likerignore it. (p => q)= p 1 V q  $\neg (p \Rightarrow q) = p \wedge q'$ d | Ybor, frequent (d, bor) =) exist heer serves (bor, heer) and thes (d, hear) for all bors, if a drinker frequents to a ber implies that there exist a beer in that bor that drinker likes exist frequent (dibar) and not fexist heer serves (heriheer) and likes (dilea) Select x.drinker drinker not in

Select y drinker

from free y not exists

where

Select 2 bor

from serves 2, likes u

from y bor = 2 bor and

where y bor = 2 bor and

y drinker = u drinker and

2 hear = u hear from frequents x where xidrinher not in

3

all drinkers that frequent some bor that serves only been that they If a bor serves a beer different then the drinter likes, drinker should not Le present. {d| exists bor frequent (diber) and forall heer (serves (her, heer) => Ukes (d, beer))} p=)q=p'vq=7 (p / q') Edlexists bor frequent (d, ber) and not exist been (serves (bor, heer) and not likes (dibeer) delect \* drinker from freg X where not exists from serves y where x borred, her and x.bor=y.ber on.

not exists / select &

from likes 2

where 2.beer=y.beer and

2.drinber=x.drinber Knong A
Uga B Koray Efes

Koy C

(L

Bud

C Bud

that freq. some her that serves some heer that a all drinkers They don't like, {d | exists frequent (dibar) and not like (dheer)) exist beer (serve (bor, heer) and Jeleot x. drinker from freq x, serve y where xibour='y, bor and not exists / select
from thes Z

heer= y heer and
where Z heer= x dember = x dember = x -Find all drinkers that freq some her that serve only been that they don't like. forall heer (serves (bar, heer) => Apt like (d, heer))} { dl exists freq (d, bar) and p=>9= p'Vq=7(pAq') not exists heer (serves (her, heer) and like (d, heer))?

- x.drinber (dlexists freq (diber) and select x drinker from frog x where not exists Select \$\\
\text{from serves } y, likes z
\text{where } y, bar = x bar and
\text{where } \text{y, bar = x beer and}
\text{y, beer = 2, beer and}
\text{x, drinker = 2, drinker}

attarinhers that freq only hers that serve some heer that They don't like. (d) forall freq (d, boar) => exists beer (serves (bor, beer) and not like (d, beer)))  $P \Rightarrow Q = P'VQ = T(PNQ')$ of | freq (diher) } not exists (serves (berikeer) and not like (dikeer)) (d) exist frag(d, her) and select x drinker from freq X where x-drinker notin Select Jedrinker where not exists select \$

from serves 2

where y, her=2, hor and

where y select \$

not exists / select \$

from Uhes U

where y drinker= u, drinker and

where y, drinker= z, heer

u, heer = z, heer

all drinkers that free only bers that serve only bear Floor they don't like (d) focall bar frequent (dibor) > forall hear (serves (burnheur) =) not like (dileer))}  $p=)q=p|Vq=7(p\Lambda q!)$ { d | forall ber freq (diber) =) not exist heer (serves (har, heer) and the (diheer))) ¿ al posts freq (diber) = exist heer (serves (her, heer) and the (d, heer))? (d) exists frog (diber) and felect x.drinker from freq x where, x not in gleet y drinker

from from y serve 2, the 4

from from y serve 2, they and

where ord

y hour = 2 bor and

y heer = u heer