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Q1)
a- ∏m-id,title(σ year=2022 Λ dCountry='Turkey' (Movie x Director))

b- ∏s-id,name(σ year>=1960 Λ year<=1969 Λ dName='Alfred Hitchcock' (Movie x Director x StarIn x MovieStar))

c- ∏name,birthYear,sCountry(σ year=2022 Λ rating>6.0 Λ (2023-birthYear)>40 (Movie x StarIn x MovieStar))

d- ∏dName(σ dCountry='Turkey' (Director)) - ∏dName(σ rating<6.0 (Movie x Director))

e- ∏name,sCountry(σ year=2022 Λ genre='horror' Λ dCountry='USA' Λ (2023-birthYear)<25 (Movie x Director x StarIn x MovieStar))

f- 𝒢 AVG(rating)->AvgRating(σ genre='horror' Λ dName='Alfred Hitchcock' (Movie x Director))

g- 𝒢 COUNT(m-id)->NumOfMovies,year(σ genre='comedy' Λ rating>9.0 (Movie))

h- 𝒢 COUNT(m-id)->NumOfMovies,dName(σ genre='action' Λ year>2010 Λ rating>6.0 (Movie)) HAVING NumOfMovies>=3

i- ∏dName(σ year=2022 Λ genre='drama' (𝒢 MAX(rating)->MaxRating (Movie) x Director))

j- ∏dCountry,dName(σ year=2022 Λ genre='drama' (𝒢 MAX(rating)->MaxRating (Movie) x Director))

k- ∏year,dCountry,dName(σ genre='drama' (𝒢 MAX(rating)->MaxRating (Movie) x Director))

l- ∏dName(σ year=2022 Λ genre='western' Λ dCountry='USA' Λ rating > 𝒢 AVG(rating)->AvgRating (σ genre='western' Λ dName='Clint Eastwood' (Movie)) (Movie x Director))

Q2)
A- Not holds. Let R,S,T be relations with a single attribute A.

- R={(1),(2)}
- S={(1),(3)}
- T={(2),(3)}

S⋈(R∪T)={(1)}
(T∪S)⋈R={(1),(2)}

b- Holds. If a tuple occurs in (T-S), it is in T but not in S. The same holds true for every tuple in (T-R); it is in T but not in R. As a result, (T)-(S)U(T)-(R) will represent all tuples that are in T but not in S or R. T-(SUR) is equivalent to this.

c- Not holds. Let R,S be relations with the attributes A and B, with L denoting "A" and denoting "A=1".

- R={(1,10),(2,20)}
- S={(1,11),(3,30)}S={(1,11),(3,30)}

1) $\pi A(\sigma A=1((R \cup S)-S)) = \pi A(\sigma A=1\{(2,20)\}) = \{\}$

2) $\sigma A=1(\pi A(R \cup S)-\pi A(S)) = \sigma A=1(\{1,2,3\}-\{1,3\})=\{2\}\sigma A=1(\pi A(R \cup S)-\pi A(S)) = \sigma A=1(\{1,2,3\}-\{1,3\}) = \{2\}$

The results of one and two were not equal. Not holds.