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CS353 - Homework 1

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Q 1)

$$a) \Pi_{e-id, e-name} \left(\left(\sigma_{e-dept = 'Construction'}^{(employee)} \right) \bowtie works \bowtie \left(\sigma_{p-city = 'Ankara' \wedge budget > 1000000}^{(project)} \right) \right)$$

$$b) \Pi_{e-id, e-name} \left(\sigma_{rank > 5 \wedge e-city = p-city}^{(employee \bowtie works \bowtie project)} \right)$$

$$c) \Pi_{e-id, e-name} \left(\left(\sigma_{e-dept = 'Construction'}^{(employee)} \right) \bowtie works \right) \div \left(\Pi_{p-id} \left(\sigma_{p-city = 'Istanbul'}^{(project)} \right) \right)$$

$$d) \Pi_{e-id, e-name} \left(\left(\sigma_{e-city = 'Ankara'}^{(employee)} \right) \bowtie \sigma_{duty = 'Technician' \wedge since > 2020}^{(works)} \right) \bowtie \left(\sigma_{salary > 100000}^{(paying \bowtie employee)} \right)$$

$$e) \Pi_{p-id, p-name} \left(\sigma_{p-city = 'Istanbul'}^{(project)} \div \left(\sigma_{salary > 100000}^{(paying)} \bowtie works \bowtie \sigma_{p-city = 'Istanbul'}^{(project)} \right) \right)$$

$$f) \Pi_{salary} \left(\sigma_{rank = \begin{matrix} (paying) \\ \max(rank) \text{ of } \max(rank) \end{matrix}}^{(employee)} \right)$$

$$g) p-city \int_{count(p-id) \text{ as number of Projects, sum(budget) as total Budget}}^{(project)}$$

$$h) rank \int_{count(e-id) \text{ as numEmployee}}^{(\sigma_{e-city = 'Ankara' \wedge budget > 100000}^{(employee \bowtie works \bowtie project)})}$$

$$i) \Pi_{p-id, p-name} \left(\sigma_{p-city = 'Istanbul' \wedge budget > \left(\int_{\max(budget) \text{ as max Budget}}^{(p-city = 'Ankara')^{(project)}} \right)}^{(project)} \right)$$

$$j) \Pi_{p-id, p-name} \left(\sigma_{p-city = 'Ankara' \wedge budget \geq 2 * totalSalary}^{(project \bowtie (p-id \int_{sum(salary) \text{ as totalSalary}}^{(works \bowtie employee \bowtie paying)}) \wedge project.p-id = works.p-id)} \right)$$

$$k) \Pi_{e-id, salary} \left(\left(\sigma_{p-city = 'Ankara'}^{(project)} \right) \bowtie works \bowtie employee \bowtie paying \right)$$

$$project.budget = \left(\int_{\max(budget) \text{ as maxBudget}}^{(project)} \right)$$

Q.2) $\pi_{E,A}(R) - \pi_{E,A}(R \cap S) = \pi_{E,A}(R) \cap \pi_{E,A}(R - S)$

Prove or disprove.

Let $R = \{(1,2), (1,3)\}$
 $S = \{(1,2), (1,4)\}$ } A counter-example.

According to above values of A and B, our expression evaluates to:

$$\Rightarrow \{1\} - \{1\} = \{1\} \cap \{1\}$$

$$\Rightarrow \emptyset = \{1\}$$

\Rightarrow NOT True \Rightarrow The expression is disproven