BSCCS2001: Graded Assignment with Solutions
Week 12

1. Consider the relation **Classroom** as shown below   [MCQ:2.5points]

Name	RollNo	Age	Marks	Subject
David	M003	23	78	Maths
Matthew	S007	29	54	English
Anand	C001	22	89	JAVA
Mitchel	M006	21	56	Maths
Shaun	M009	26	92	Maths
Jimmy	C009	29	42	JAVA
Richard	S003	20	99	English

Relation **Classroom**

Choose the correct output of relational algebra expression
$\pi_{Name}(\sigma_{age>25}(\sigma_{Subject='JAVA'}(Classroom)))$

○
Name
Anand
Jimmy

✓
Name
Jimmy

○
Name	Age
Jimmy	29

○ Invalid relational algebra expression

Solution: According to Equivalence Rule 1 (Slide no 57.11),
$\pi_{Name}(\sigma_{age>25}(\sigma_{Subject='JAVA'}(Classroom)))$
$= \pi_{Name}(\sigma_{age>25 \wedge Subject='JAVA'}(Classroom)))$
Thus, option 2 is correct.

2. Which of the following is/are true? [MSQ:2.5points]

    ✓ $(E1 \cup E2) \cup E3 = E1 \cup (E2 \cup E3)$

    ○ $\sigma_\theta(E_1 \cup E_2) = \sigma_\theta(E_1) \cup E_2$

    ✓ $\pi_L(E_1 \cup E_2) = (\pi_L(E_1)) \cup (\pi_L(E_2))$

    ○ All of the above

> **Solution:** Please refer to slide no 57.16

3. Consider the following statements. [MCQ:2.5points]

1. $\sigma_{\theta_1 \wedge \theta_2}(E_1 \bowtie_\theta E_2) = (\sigma_{\theta_1}(E_1)) \bowtie_\theta (\sigma_{\theta_2}(E_2))$, this is true only when θ_1 involves only the attributes of E_1 and θ_2 involves only the attributes of E_2.

2. $\prod_{L_1 \cup L_2}(E_1 \bowtie_\theta E_2) = \prod_{L_1}(E_1) \bowtie_\theta \prod_{L_2}(E_2)$, this is true when θ involves only attributes from $L_1 \cup L_2$.

3. $(E_1 \bowtie_{\theta_1} E_2) \bowtie_{\theta_2 \wedge \theta_3} E_3 = E_1 \bowtie_{\theta_1 \wedge \theta_3} (E_2 \bowtie_{\theta_2} E_3)$, this is true when θ_2 involves attributes from E_2 and E_3 only.

Choose the correct option.

    ○ Statement 1 and 3 are correct

    ○ Statement 1 and 2 are correct

    ○ Statement 2 and 3 are correct

    ✓ All the statements are correct

> **Solution:** Refer to Equivalence rules slides in lecture 57.

4. Consider that E_1 and E_2 are two relational algebra expressions.
   Identify the incorrect statement. [MCQ:2.5points]

   ○ $E_1 \bowtie_\theta E_2 = E_2 \bowtie_\theta E_1$

   ✓ $E_1 - E_2 = E_2 - E1$

   ○ $E_1 \cup E_2 = E_2 \cup E1$

   ○ $E_1 \cap E_2 = E_2 \cap E1$

Solution:

- Theta-join operations are commutative.

- The set operations union and intersection are commutative. However, set difference is not commutative

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