PDPM IIITDM JABALPUR
DBMS
Assignment 8

All questions involve a database about student organizations, with two tables:
OFFICERS (club role pname) and LOCATION (club room). There is an example instance below.

1. Consider a following relational algebra query over this database:

   ρ (oclub, role, pname) (OFFICERS)

   $\pi_{\text{pname,room}}(\sigma_{\text{oclub = club AND role = 'Treasurer'}}(\text{OFFICERS X LOCATION}))$

   Write an equivalent (always gives the same answer) relational algebra query using join.

2. Give the result of the relational algebra query in Question 1 when applied to the following database instance.

OFFICERS	**club**	**role**	**pname**
	outdoor	President	Rosy
	outdoor	VP	Lalit
	outdoor	Treasurer	Mohan
	biking	President	Moti
	biking	VP	John
	biking	Treasurer	Bharat
	sailing	President	Akash
	sailing	VP	Amita
	sailing	Treasurer	Prakash

LOCATION	**club**	**room**
	outdoor	SH118
	biking	NH312

3. For each algebraic expression given below, say whether it is true or false in general. Whenever your answer is "false", give an example instance of the database where the two expressions are not equal (and show the value of the expressions for your database instance). For Cartesian products, club attribute of OFFICER is renamed as oclub.

a. $(\sigma_{\text{club = 'biking'}}\ (\sigma_{\text{role = 'Treasurer'}}(\text{OFFICERS})) = (\sigma_{\text{role = 'Treasurer'}}\ (\sigma_{\text{club = 'biking'}}\ \text{OFFICERS}))$

b. $\pi_{\text{room}}(\sigma_{\text{oclub = club}}(\text{OFFICERS} \times \text{LOCATION})) = \pi_{\text{room}}(\text{LOCATION}))$

c. $\pi_{\text{pname,room}}(\sigma_{\text{oclub = club AND role = 'Treasurer'}}(\text{OFFICERS} \times \text{LOCATION})) =$

$\pi_{\text{pname,room}}(\sigma_{\text{oclub = club}}\ (\sigma_{\text{role = 'Treasurer'}}(\text{OFFICERS}) \times \text{LOCATION}))$

d. $\pi_{\text{pname}}(\text{OFFICERS} - \sigma_{\text{role = 'Treasurer'}}(\text{OFFICERS})) =$

$\pi_{\text{pname}}(\text{OFFICERS}) - \pi_{\text{pname}}(\sigma_{\text{role = 'Treasurer'}}(\text{OFFICERS}))$