Consider the following **relational database schema** in a fitness centre which offers taught classes. Underlined attributes represent the primary keys of each relation:

1. **Instructor**(iId, name, email, address, speciality)
2. **Member**(mId, name, email, since)
3. **Class**(cId, cName, iId, type, cost)
4. **Enrols**(mId, cId)

Write the relational algebra expressions for the following queries:

Find the instructors who teach at least one class that cost at least 25. Show the IDs (iIds) of those instructors.

$$\Pi_{iId}(\sigma_{cost \geq 25}(Class))$$

Find the members who have not enrolled in any ‘kickboxing’ classes. Show the names of those members. Note that ‘kickboxing’ is a type of class.

$$\Pi_{name}(Member \bowtie (\Pi_{mId}(Member) - \Pi_{mId}(Enrols \bowtie (\sigma_{type = \text{“kickboxing”}}(Class))))$$

Find the members who have enrolled in all classes taught by an instructor whose name is ‘Lana’. Show the names and IDs (mIds) of those members.

$$\Pi_{mId,name}(Enrol \bowtie Member \div \Pi_{cId}(Class \bowtie (\sigma_{name = \text{“Lana”}}(Instructor)))$$

Find the members who have the same name as some other member. Show the names of those members

$$\Pi_{name}(\sigma_{m1.mID \neq m2.mID \wedge m1.name = m2.name}(\rho_{m1(mID,\ name)}(Member) \times \rho_{m2(mID,\ name)}(Member)))$$

Question Two - ER Modeling