Since:

```
. Branch(branchID, name, street, city, postalCode, managerID)
. Item(itemID, type, genre, pubYear, language, shelfLocation, status, branchID)
. Member(memberID, name, dob, phone, email, homeAddress, registrationDate,
preferredBranchID)
. Borrow(borrowID, itemID, memberID, branchID, checkoutDate, dueDate, returnDate,
returnCondition)
. Employee(employeeID, name, contactInfo, dateHired, role, branchID)
. Hold(holdID, itemID, memberID, dateRequested, status)
. Event(eventID, title, description, dateTime, audience, branchID)
. Acquisition(itemID, vendor, purchaseDate, cost)
```

```
. Symbol to use:
    π = Projection
    σ = Selection
    ⋈ = Join
    ∧ = And
```

- Step 2:

```
1. Prove or explain why they are equivalent.

        π_name (σ_name='Central' (Branch) ⋈ Member.preferredBranchID =
Branch.branchID (Member))

is Equivalent to:

        π_Member.name((Member) ⋈ (σ_name='Central' (Branch)))
```

```
. Explanation:
Both retrieve name from Member Table where their preferred branch is 'Central',
and the different between both of them just projection position, but the final
result is the same.
```

1. Find the names of members who registered at the 'Central' branch.

```
    π_name (σ_name='Central' (Branch) ⋈_Member.preferredBranchID =
Branch.branchID (Member))
```

2. Get the titles of all items that are currently checked out.

```
    π_title (σ_status='checked out' (Item))
```

3. Retrieve the IDs of items that are both DVDs and in English.

```
    π_itemID (σ_type='DVD' ∧ language='English' (Item))
```

4. List names of members who borrowed items from the 'West' branch.

```
    π_name (
        (σ_name='West' (Branch) ⋈_Branch.branchID = Borrow.branchID)
⋈_Borrow.memberID = Member.memberID (Member)
    )
```

5. Get IDs of items that were borrowed and not yet returned.

```
    π_itemID (σ_returnDate IS NULL (Borrow))
```