Question 1. [7 MARKS]

Here is a simple schema for managing projects at a consulting company.

Client(<u>cID</u>, budget)
A client with projects with the company, and their total project budget.

Employee(<u>eID</u>, name, position, rank)
An employee of the company.

Project(<u>pID</u>, cID, deadline)
A project for a client with the given deadline.

Assignment(<u>pID, eID</u>)
Assignment of an employee to work on a particular project.

Assignment[pID] = Project[pID]
Assignment[eID] ⊆ Employee[eID]
Project[cID] ⊆ Client[cID]

Part (a) [2 MARKS] Consider the following constraint.

$$\text{Temp}(\text{pID, cID, eID}) := \Pi_{\text{pID, cID, eID}}(\text{Project} \bowtie \text{Assignment})$$
$$\sigma_{\text{T1.eID} = \text{T2.eID} \wedge \text{T1.cID} = \text{T2.cID} \wedge \text{T1.pID} \neq \text{T2.pID}}(\rho_{\text{T1}}\text{Temp} \times \rho_{\text{T2}}\text{Temp}) = \varnothing$$

Give an example of a smallest possible non-empty instance that violates this constraint.

Client:

cID	budget
101	1000

Employee:

eID	name	position	rank
123	Danny	professor	senior