1. Entity Relationship (ER) Model Exercises
We want to create database for a bank in which we store:

- Customers (id, name, city).
- Accounts (number, balance)
- Loans (number, amount)
- Branches (name, city, assets)

- Each customer can have any number of accounts and loans
- Each account and loan is associated with one branch.
- A customer must have either one account or loan in order to be in the database
- The balance in each account should be >$100.

*The last two constraints cannot be expressed by the ER diagram.*
Solution

Participation constraint
Cardinality constraint
We want to create a very simple database for HKUST in which to record information about professors, students and classes.

- For each professor we need to store the HK-id, name and office number.
- For each student we need to store the student-id and name
- For each class the id (e.g., CSE 3311) and the name.
- Each class is taught by exactly one professor.
- Each student must take at least one class.
- For each class that a student took we need to store the grade

*Simplifying assumptions: there is only one lecture for each class and only one semester in the database.*
Is there any additional assumption in the diagram?
Does a professor have to teach a class?
Example

A bus company wants to keep track of its bus routes and schedules. Design an ER diagram for the database according to the following description. Identify all constraints and keys:

Each bus route has a route number, a departure station and a destination station.

For each bus route, there is a schedule, which records the departure times of buses.

For each departure time of each route, a driver and a bus can be assigned (however this is not necessary - information about the driver or the bus may sometimes be missing)

A driver has an employee Id, a name and a phone number.

A bus is identified by its license number. The database also records the seating capacity of each bus.
Solution