A-1.1

Designing a simple ERD:

The goal of this assignment is to develop a simple relational model for a basic grants management tracking system. In a research environment, grants are given by foundations such as the National Institute of Health (NIH) or National Science Foundation (NSF) to universities. Usually there is a research lead or principle investigator (PI) that manages the grant. The following paragraphs provide an English description of each entity with attributes. It also describes the relationships between entities.

Principal Investigator (PI)

A PI is someone who runs the research project and owns funding responsibility. A PI has a name, employee ID, email address, and total award amount.

Organization

An organization represents the entity that employs the PI and researchers involved in working on the grant. It has a name, address, and type (domain is a specific set of values = Research, Education, Corporate).

Grant

The grant is an awarded amount of money to fund the research efforts. A grant has attributes for start and end dates, grant title, amount, and description.

Researcher

Researchers allocated time to specific grants. A researcher has a name, employee id, email address

Program

A program is a category for different types of grants. For example, programs may include things like Genetic Blood Research, Young Scientist's Education, etc. A program has a name, start date, end date, location, description

Relationship Descriptions

- A Principle Investigator can manage several grants. A PI works for a specific organization.
- An organization can employ many researchers and PIs
- A grant can be worked on by many researchers.
- And a researcher can be involved in many grants. But there may be researchers "on the bench" - not assigned to a grant.
- A grant can belong to a specific program (but not required)

A program can be assigned to many grants.

Problem statement:

Use defined shapes such as rectangles or diamonds (where applicable) to represent the entities and connecting lines with cardinality indicators at each end to represent the relationship of the entities and attributes to come up with an ERD.

You may represent the cardinality using the crow's foot notation as well.

(Refer the slides ANLT 242-3)

A-1.2

Consider the LIBRARY relational database schema shown in the following figure. Hint - The term "how many" and "number of" refer to using the function COUNT to determine number of rows.
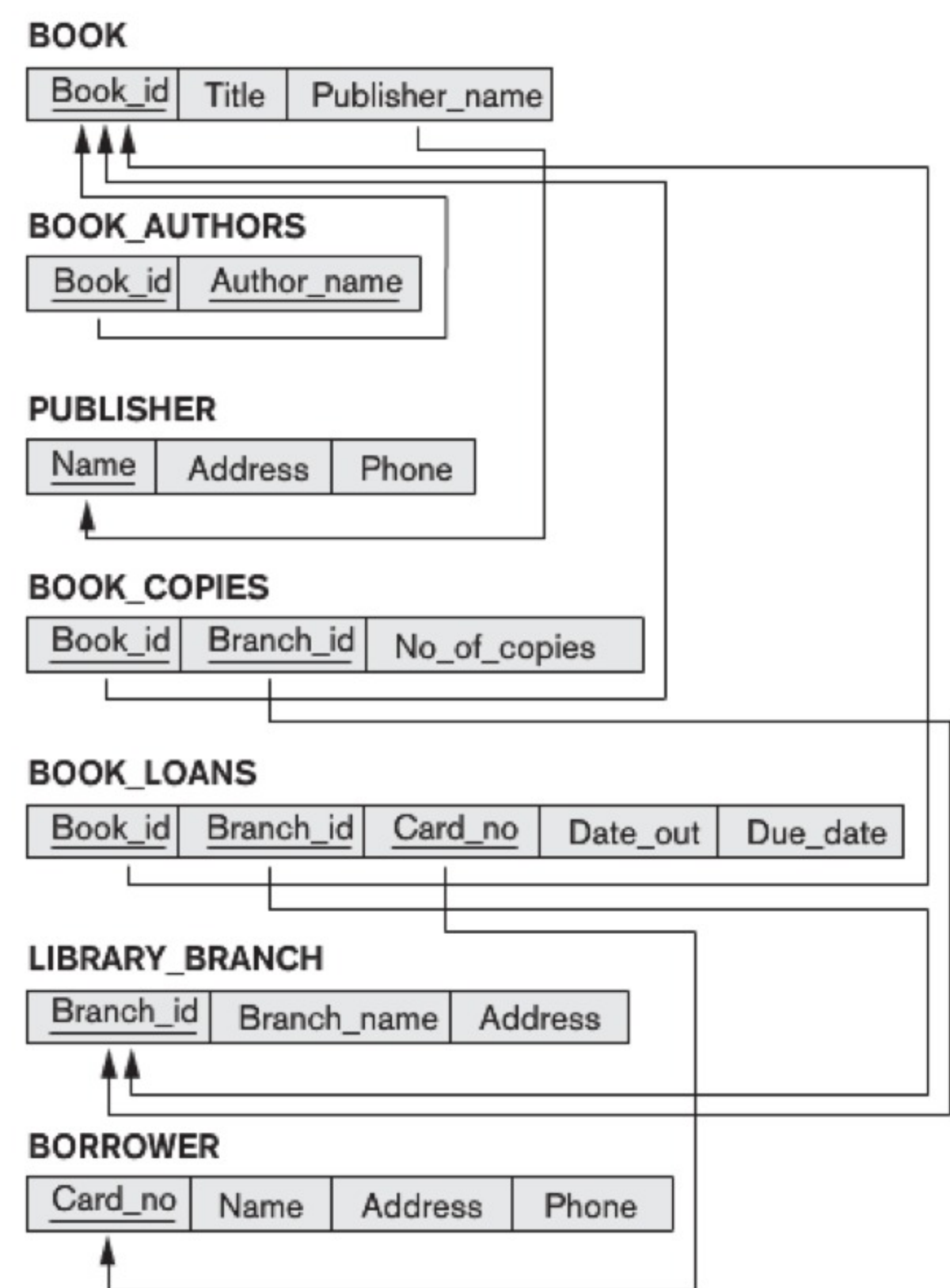

Write down relational expressions for the following queries:

(1) How many copies of the book titled "The Door to Inferna" are owned by the library branch whose name is "Livermore"?

(2) How many copies of the book titled " The Door to Inferna " are owned by each library branch?

(3) Retrieve the names of all borrowers who do not have any books checked out.

(4) For each library branch, retrieve the branch name and the total number of books loaned out from that branch.

A-1.3

Refer to the COMPANY relational database schema shown below and write the relevant SQL queries as stated:
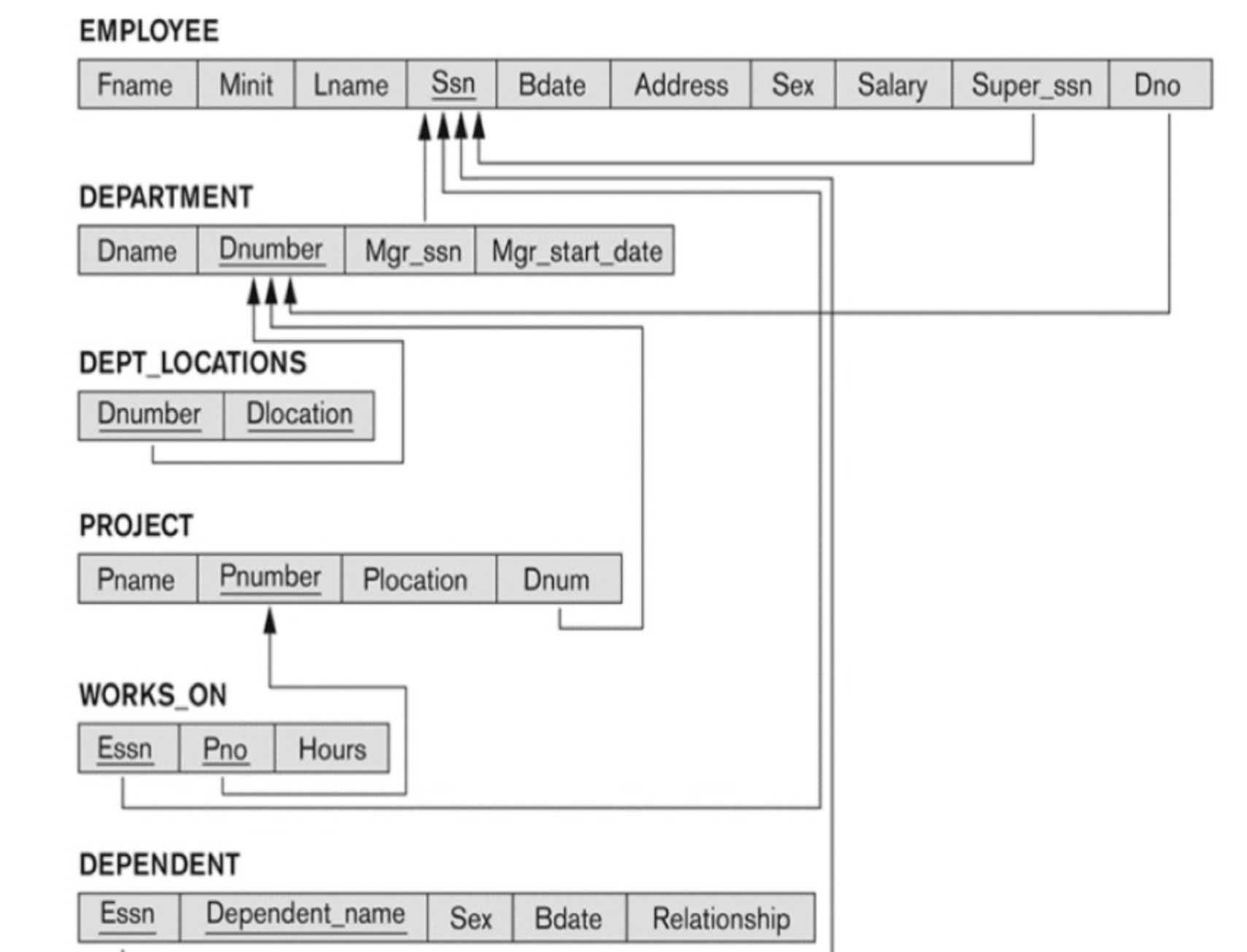
(1) Retrieve the names of all employees in department E1 who work more than 25 hours per week on the REFACTOR project.

(2) List the names of all employees who have a dependent with the same first name as themselves.

(3) Retrieve the names of employees who work on every project.

(4) For each project, list the project name and the total hours per week by all employees, spent on that project.

(5) List the last name of employees who have daughters.

A-1.4

Consider the following relations for a database which has the following schema:

SALESPERSON(Ssn, Name, Start_year, Dept_no)

TRIP(Ssn, From_city, To_city, Departure_date, Return_date, Trip_id)

EXPENSE(Trip_id, Account_No, Amount)

(1) Give the details (all attributes of trip relation) for trips that exceeded $5,500 in expenses.

(2) Print the Ssns of salespeople who took trips to St. Louis.

(3) Print the total trip expenses incurred by the salesperson with SSN = '021-76-5432'