Assignment #2 (150pt)

- **Do Exercises (p. 62):**
  - 2.10, 2.11, 2.12, 2.13, 2.15, 2.18
- **Due: One Week Later**
  - Before the lecture – 9/21 (Wed)
- **Method: upload your report in Cyber Campus**
  - Questions are uploaded in Assignment 2 folder
  - Answers must be written in English !

2.10 (10pt)

- Describe the differences in meaning between the terms *relation* and *relation schema* of the following example.

123-456-222	John
234-567-999	Mary

2.11 (10 pt)

- Consider the *advisor* relation shown in the schema diagram in **Figure 2.9**, with *s_id* as the primary key of *advisor*. Suppose a student can have more than one advisor. Then, would *s id* still be a primary key of the *advisor* relation? If not, what should the primary key of *advisor* be?

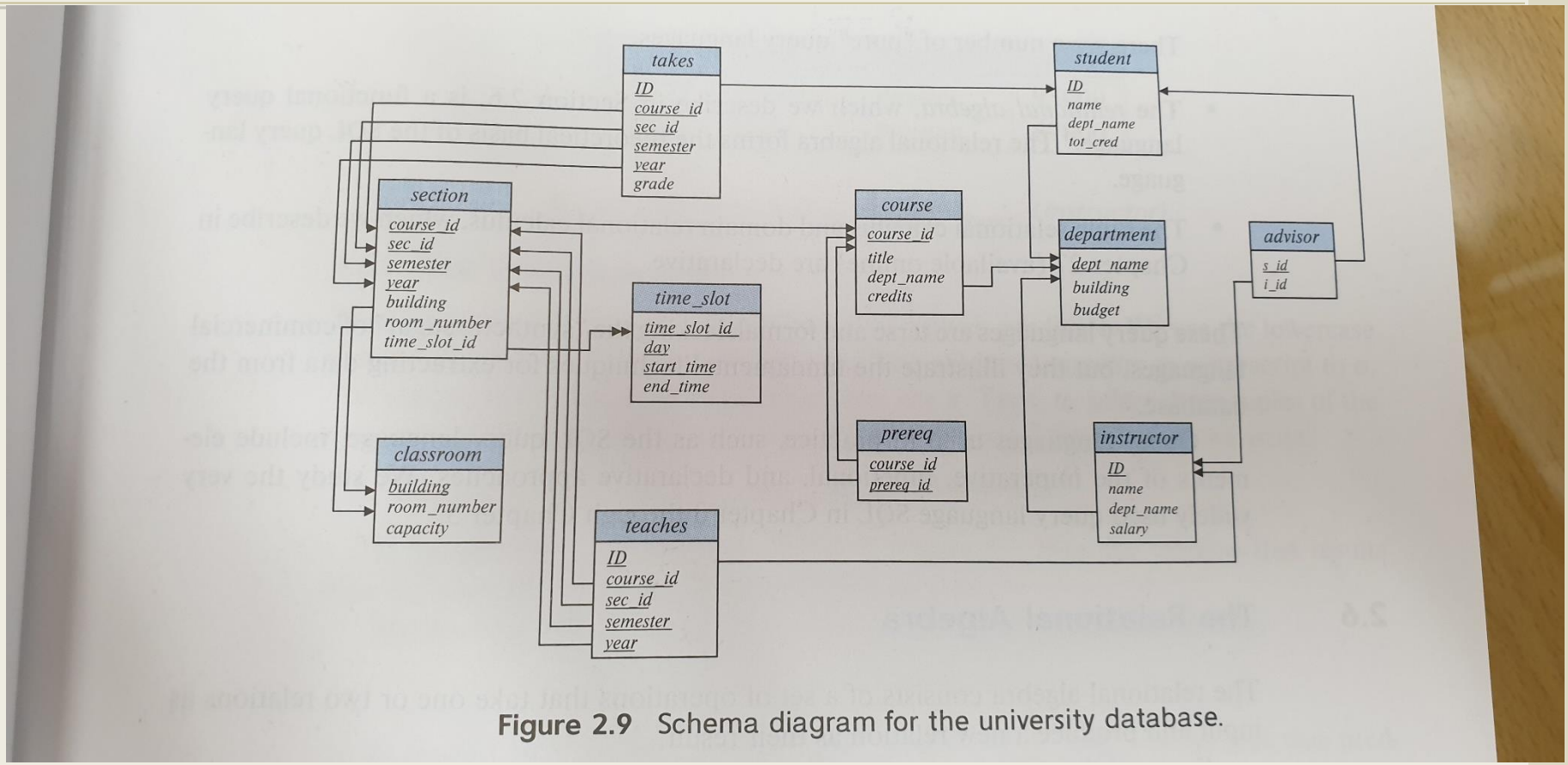

Figure 2.9 Schema diagram for the university database.

branch(*branch_name*, *branch_city*, *assets*)
customer (*ID*, *customer_name*, *customer_street*, *customer_city*)
loan (*loan_number*, *branch_name*, *amount*)
borrower (*ID*, *loan_number*)
account (*account_number*, *branch_name*, *balance*)
depositor (*ID*, *account_number*)

Figure 2.18 Bank database.

2.12 (20pt)

- Consider the bank database of **Figure 2.18**. Assume that branch names and customer names uniquely identify branches and customers, but loans and accounts can be associated with more than one customer.
  - a. What are the appropriate primary keys?
  - b. Given your choice of primary keys, identify appropriate foreign keys.

2.13 (30pt)

- Construct a schema diagram for the bank database of **Figure 2.18**.

2.15 (30pt)

- Consider the bank database of **Figure 2.18**. Give an expression in the relational algebra for each of the following queries:
  - a. Find each loan number with a loan amount greater than $10000.
  - b. Find the ID of each depositor who has an account with a balance greater than $6000.
  - c. Find the ID of each depositor who has an account with a balance greater than $6000 at the "Uptown" branch.

2.18 (50pt)

- Write the following queries in relational algebra, using the university schema.
  - a. Find the ID and name of each instructor in the Physics department.
  - b. Find the ID and name of each instructor in a department located in the building "Watson".
  - c. Find the ID and name of each student who has taken at least one course in the "Comp. Sci." department.
  - d. Find the ID and name of each student who has taken at least one course section in the year 2018.
  - e. Find the ID and name of each student who has not taken any course section in the year 2018.