Task 1 (0.4 mark)

Read and analyze the relational schemas listed below. For each one of the relational schemas find all nontrivial functional dependencies valid in the schemas. Then, for each schema, explain which functional dependencies cause the redundancies (if any).

STUDENT(snumber, first-name, last-name, ccode)
A relational table STUDENT contains information about the students and the courses enrolled by the students. A course (ccode) is enrolled by more than one students (snumber) and each student enrols several course. Student number (snumber) uniquely identifies each students and course code (ccode) uniquely identifies each course. The first (first-name) and the last (last-name) names describe the students.

snumber → first-name, last-name

A functional dependency snumber → first-name, last-name
trigger the redundancies because if student enrols more than one course then his/her number (snumber) must be repeated many times in the associations with the values of ccode. Then, the functional dependency forces the same values of first-name and last-name for each repetition of the same snumber.

HOTEL(name, city, capacity, enumber, salary)
A relational table HOTEL contains information about the hotels and employees working in the hotels. A hotel is identified by a pair of attributes (name, city) and it is also described by the total number of rooms available (capacity). Each employee is identified by employee number (enumber) and it is described by a salary (salary).
name, city → capacity
enumber → name,city
enumber → salary

A functional dependency name, city → capacity
triggers the redundancies because if a hotel has many employees then the pairs of values of attributes (name, city) must be repeated as many times as many employees work for a hotel. Then the functional dependency forces the repetitions of the same values of capacity for each identical pair of (name, city).

WAREHOUSE(wname, address, part, quantity)
A relational table WAREHOUSE contains information about the names of warehouses (wname) located at the given addresses (address). Each warehouse is located at one address and there is only one warehouse at each address. Parts (part) are stored in a warehouse. A quantity of each part is determined by a value of attribute quantity.

```
wname → address
address → wname
wname, part → quantity
```

A functional dependency `wname → address`
triggers the redundancies because if a warehouse stores many parts then a value of an attributes (`wname`) must be repeated as many times as many different parts are stored in a warehouse. Then the functional dependency forces the repetitions of the same values of `capacity` for each identical value of (`wname`).

`LIBRARY(cnumber, title, price, isbn)`
A relational table `LIBRARY` contains information about the books available from a library. Each copy of a book is uniquely identified by call number (`cnumber`). A book has one title (`title`) and one price (`price`). International system book number (`isbn`) is commonly used to uniquely identify a book.

```
cnumber → title, price
cnumber → isbn
isbn → title, price
```

A functional dependency `isbn → title, price`
triggers the redundancies because if a library has multiple copies of the same book with different `cnumber` then all these copies will have same `isbn`. Then the functional dependency forces the repetitions of the same values of `title` and `price`.