

## 回答下列問題

1. (20%) List five different types of database users, and briefly explain how they use a database system (e.g., from the view points of access right, user interface, responsibility, etc.).
2. (20%) List five major advantages of using a database system comparing to using a traditional file management system.
3. (20%) What is the ANSI/SPARC three-schema architecture? Explain the details of each schema.
4. (10%) During transaction processing, a DBMS usually perform checkpoints regularly. Explain the purposes of having checkpoints and why they are needed.
5. (10%) Explain what the Two-phase locking protocol means in processing transactions.
6. (20%) Explain the following terms used in relational database systems.
  - (a) Relation
  - (b) Attribute
  - (c) Record
  - (d) SQL
  - (e) Join operation