This is intended as a guideline for studying for the final… but only as a guideline! I wouldn’t have covered something if I didn’t think it was important. If you are wondering about a topic and you don’t see it here, ask me!

Data Modeling

- Entities, attributes, identifiers, relationships
- Foreign keys – what, why, and when
- Criteria for evaluating the quality of a model
- Notation (use book’s notation)
- Types of relationships (one-to-one, one-to-many, many-to-many, recursive, etc.)
- Identifiers (what should the primary key be? Should it be meaningful? When is best to generate a random id?)
- Entity types: independent, weak or dependent, associative, aggregate, subordinate
- Generalization and aggregation
- Seven habits of highly effective data modelers

Normalization

- Functional dependency
- Normal Forms (1st, 2nd, 3rd in detail with knowledge of definitions of Boyce-Codd, 4th and 5th)

Relational Algebra

- Domain and relations
- Types of keys (primary, candidate, alternate, foreign)
- Operations: Restrict, project, product, union, intersect, difference, join, divide
- Mapping of operations to SQL
- What are the primitive operators?
- Codd’s rules (commandments) for a relational database

Spatial Databases – from Doug Argall’s presentation

- What problems do they solve that cannot be handled with relational databases
- Spatial operators
- Spatial Data Types

Data Structure and Storage

- Disk manager, file manager, DBMS responsibilities
- Reducing head movement vs reducing disk accesses
- Techniques for reducing disk accesses, including advantages and disadvantages, what operations they best support, etc.
  - Indexing
  - Multiple indexes
  - B-trees
  - Hashing
  - Bitmap index
  - Join index
Data Integrity

- Three goals of data integrity (protecting existence, maintaining quality, ensuring confidentiality)
- Transaction management concepts
  - The ACID concept (atomicity, consistency, isolation, durability)
  - Concurrent update control: lost update problem, locking strategies to prevent problems
  - Transaction failure and recovery
  - Concepts of commit and rollback
- Protecting existence/backup and recovery
  - Mechanisms for facilitating backup and recovery (backup facilities, journaling, recovery facility)
  - Types of journaling (transaction log, before/after image logs)
  - Types of problems (storage medium destruction, abnormal termination of transaction, incorrect data…)
  - Recovery strategies. How to recover from various problems. Remember that this depends on what types of journaling and recovery capabilities you have (table on p. 529 shows different combinations)
    - Backward recovery or rollback
    - Switching to duplicate db
    - Forward recovery or roll forward
    - Reprocessing transactions

Types of Questions

- Short answer/essay
- Multiple choice
- True/false
- Matching
- Write a stored procedure
- Given SQL (could be a stored proc), what are results?
- Create a data model
- Revise a data model
- Identify problems in a data model