1. The different products for storing data differ widely on capacity, access time, and cost per bit. Generally each technology optimizes one or two of the three attributes. So cache memory optimizes access time, at low capacity and high cost. Disk drives optimize capacity and cost, at low access time.

Given the prevalence of information technology in society and industry, different technologies come into play at different locations. So cache memory is found inside processing chips whereas disk drives are connected externally to the motherboard. The result is that information can be moved around to where it needs to be, given the constraints on capacity and access time, minimizing the total cost of the system.

2. C SC335: Object-Oriented Programming and Design
Similarity: A DBMS is a large program that needs to be structured.
Difference: Most DBMSes are implemented in a non-OO language (C).

C SC345: Analysis of Discrete Structures
Similarity: Both discuss data structures, asymptotic complexity, and space versus time performance.
Difference: Main memory allows access to the stored word (32 or 64 bits), but disks allow access only to the block (4k-32k).

C SC352: Systems Programming and Unix
Similarity: Both require command line programs on lectura.
Difference: DBMSes are generally implemented in C.

C SC372: Comparative Programming Languages
Similarity: Both courses introduce many languages, using several paradigms.
Difference: DMLs are quite a bit narrower in scope to general PLs.

C SC425: Computer Networking
Similarity: Both involve multi-tier applications communicating over the network.
Difference: JDBC hides the network from the application.

C SC445: Algorithms
Similarity: Both involve sophisticated algorithms to solve important problems.
Difference: In DBMSes, main memory component is essentially free; all that counts are disk accesses.

C SC452: Principles of Operating Systems
Similarity: Both involve large systems that are under other large systems.
Difference: The DBMS is on top of the OS.

C SC453: Compilers and Systems Software
Similarity: A DBMS has a compiler in it.
Difference: A DBMS is much bigger than a compiler.
3. Short Answer. Be specific, but brief.

3. Similarities:
* Both are computer languages used in a DBMS.
* SQL included both aspects.
* The can both be either graphical or textual languages.

Differences:
* DDL relates to the schema whereas DML relates to the instance.
* DDL can create new tables; DML cannot.
* DML results in computed tables; DDL does not.

4. A multi-tier architecture is an information management system composed of multiple components, usually running on different machines, connected in a sequenced and communicating over networks.

The alternative is a single-tier, individual program that does everything.

Benefits of multi-tier:
* Can decide where functionality and security is best located.
  For example, business rules are probably best checked not at the client.
* Each component can be individually optimized for best performance.
* Load can be spread across multiple machines. In fact, can have multiple machines at each level.

Drawbacks of multi-tier:
* Can be less robust: If any machine in the string goes down, the application goes down.
* Harder to debug, as the problem could be at any stage.
* More complex to set up and run.
* Possible security issues, if a hacker gets access to the servers.
* Generally involves lots of network traffic, and so requires a fast internal network.

Extra Credit

5. Many answers.

6. Many answers.