ANSWERS TO REVIEW QUESTIONS 2

1. It is said that file systems exhibit data dependence. Why?

File systems exhibit data dependence because file access is dependent on a file's data characteristics. Therefore, any time the file data characteristics are changed, the programs that access the data within those files must be modified. Data ***independence*** exists when changes in the data characteristics don't require changes in the programs that access those data.

2. What is data independence, and why is it important?

Data independence exists when data access programs are not subject to change when any of the file's data characteristics change. Data independence is important because it decreases programming effort and program maintenance costs.

3. Describe the basic features of the relational database model.

A relational database is a single data repository that provides both structural and data independence while maintaining conceptual simplicity.

The relational database is a collection of tables in which data are stored. Each table consists of row and columns. Tables are related to each other by sharing a common value in one of their columns.

4. Explain how the entity relationship (E-R) model helped produce a more structured relational database design environment.

entities = table

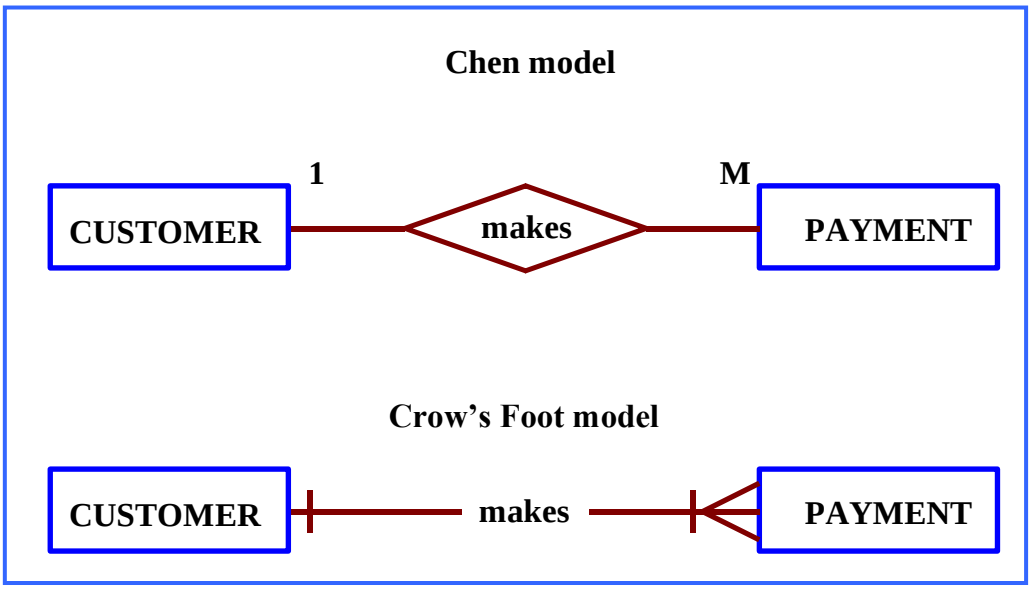
The ER model helps identify the database's main entities and their relationships. Because the ER model components are graphically represented, their role is more easily understood. Using the ER diagram, it's easy to map the ER model to the relational database model's tables and attributes.

the E-R model provided a structured and graphical representation of data requirements, entities, attributes, and relationships. It helped designers conceptualize and communicate database designs, facilitated the identification of data dependencies and constraints, and laid the foundation for structured relational database design environments.

5. Use the scenario described by "A customer can make many payments, but each payment is made by only one customer" as the basis for an entity relationship diagram (ERD) presentation.

This scenario yields the ERDs shown in figure below

fields = attribute =horizontal



6. What are connectivities, and what role do they play in database design?

Connectivities describe the nature of the relationship between entities. In the case of the preceding question 5, the connectivities 1 and M indicate the existence of a 1:M relationship between CUSTOMER and PAYMENT. Used in the ERD, the connectivities indicate the nature of the relationships between the entities. Therefore, the connectivities play an important role in the data modeling and database design processes.

7. Explain the difference between *data* and *information*.

Data are raw facts. Information is processed data to reveal the meaning behind the facts. Let's summarize some key points:

- Data constitute the building bocks of information.
- Information is produced by processing data.
- Information is used to reveal the meaning of data.
- Good, relevant, and timely information is the key to good decision making.
- Good decision making is the key to organizational survival in a global environment.

ANSWERS TO PROBLEMS 2

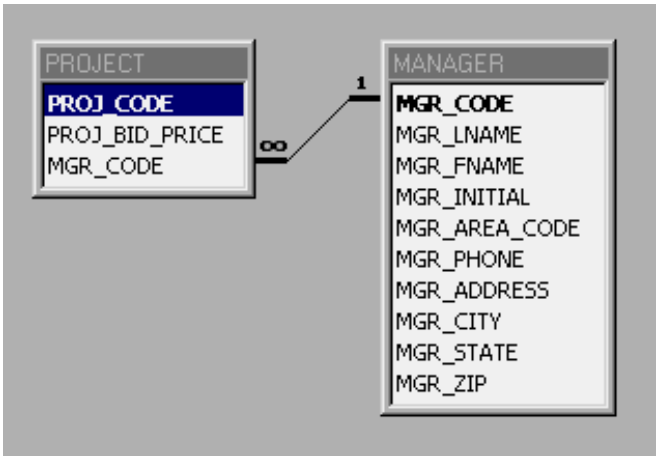
Given the file structure shown in figure below, answer Problems 1 and 2.

	PROJECT_CODE	PROJECT_MANAGER	MANAGER_PHONE	MANAGER_ADDRESS	PROJECT_BID_PRICE
▶	21-5Z	Holly B. Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	$16,833,460.00
	25-2D	Jane D. Grant	615-898-9909	218 Clark Blvd., Nashville, TN 36362	$12,500,000.00
	25-5A	George F. Dorts	615-227-1245	124 River Dr., Franklin, TN 29185	$32,512,420.00
	25-9T	Holly B. Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	$21,563,234.00
	27-4Q	George F. Dorts	615-227-1245	124 River Dr., Franklin, TN 29185	$10,314,545.00
	29-2D	Holly B. Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	$25,559,999.00
	31-7P	William K. Moor	904-445-2719	216 Morton Rd., Stetson, FL 30155	$56,850,000.00

1. **Using two relational database tables, PROJECT and MANAGER, eliminate the redundancies discovered above (in the previous exercise set, problem 4). Connect the two tables through the appropriate link. (*Hint:* Use slide #9 as an example in the slide handouts.)**

Start by splitting the manager attributes from the original table to produce the MANAGER table, then add an attribute named MGR_CODE that will uniquely identify each manager record. Use this same code in the PROJECT table to link the two tables. MANAGER table may consist of the following fields; MGR_CODE, MGR_LNAME, MGR_FNAME, MGR_INITIAL, MGR_AREA_CODE, MGR_PHONE, MGR_ADDRESS, MGR_CITY, MGR_STATE, MGR_ZIP. PROJECT table may consist of the following fields; PROJ_CODE, PROJ_BID_PICE, MGR_CODE. Note that the redundancies have been eliminated: each manager's attributes occur only once in the MANAGER table, thus eliminating the potential for anomalies. The only remaining redundancy is the manager's code, which occurs more than once in the PROJECT table.

2. Create the relational schema to show how the two database tables in problem 1 are linked.



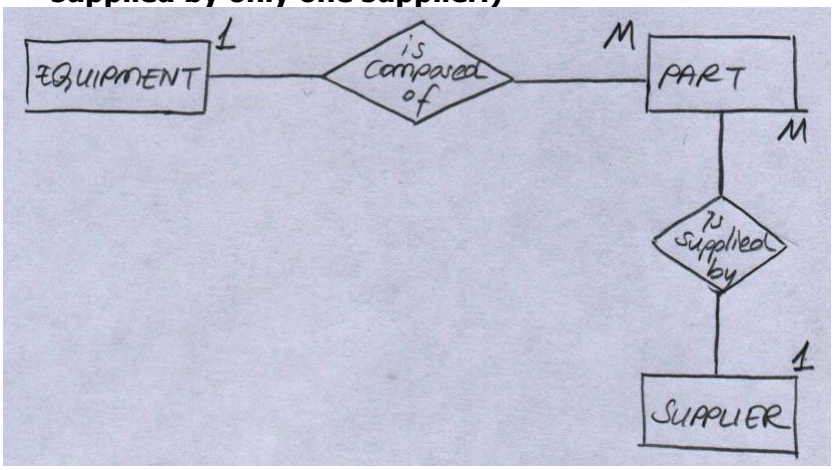
Problem 1's original table contents indicate that a manager may manage many projects, but that each project is managed by only one manager. The relational schema shown here illustrates this 1:M relationship.

3. Given the table structure shown in figure below, what problem(s) might you encounter if you deleted building KOM?

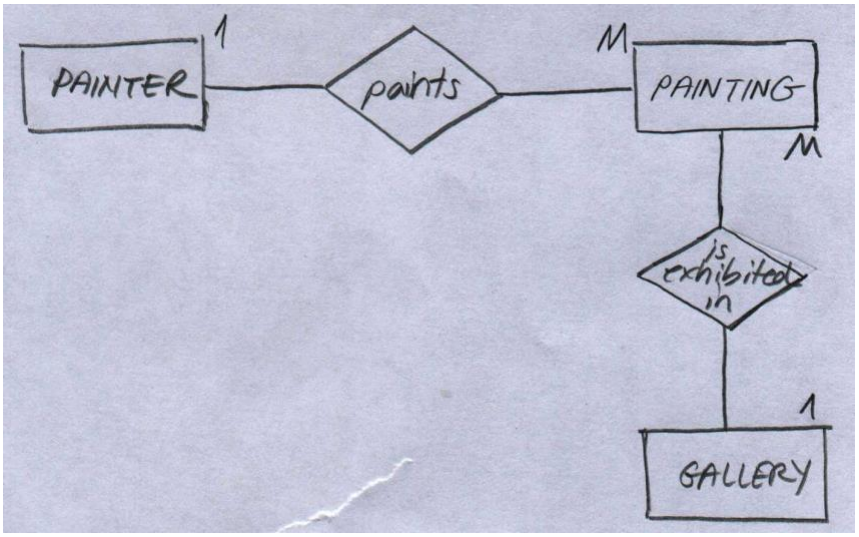
BUILDING_CODE	ROOM_CODE	TEACHER_LNAME	TEACHER_FNAME	TEACHER_INITIAL
KOM	204E	Williston	Horace	G
KOM	123	Cordoza	Maria	L
LDB	504	Patroski	Donald	J
KOM	34	Hawkins	Anne	W
JKP	225B	Risell	James	
LDB	301	Robertson	Jeanette	P

You would lose all the data about teachers Williston, Cordoza, and Hawkins, as well as the KOM rooms 204E, 123, and 34. Here is yet another good reason for keeping data about specific entities in their own tables! This kind of an anomaly is known as a *deletion anomaly*.

4. The PYRAID company wants to track each PART used in each specific piece of EQUIPMENT; each PART is bought from a specific SUPPLIER. Using this description, draw the ER model for the PYRAID company database. (*Hint*: A piece of equipment is composed of many parts, but each part is used in only one specific piece of equipment. A supplier can supply many parts, but each part has been supplied by only one supplier.)



5. United Broke Artists (UBA) is a broker for not so famous painters. UBA maintains a small database to track painters, paintings and galleries. Using PAINTER, PAINTING, and GALLERY, draw the ER model for the UBA database.
(*Hint 1*: A PAINTING is painted by a particular ARTIST, and that painting is exhibited in a particular GALLERY.
***Hint 2*: A gallery can exhibit many paintings, but each painting can be exhibited in only one gallery. Similarly, a painting is painted by a single painter, but each painter can paint many paintings.)**



6. If you decided to convert the ER model in Problem 5 to a relational database:

a. What tables would you create, and what would the table components be?

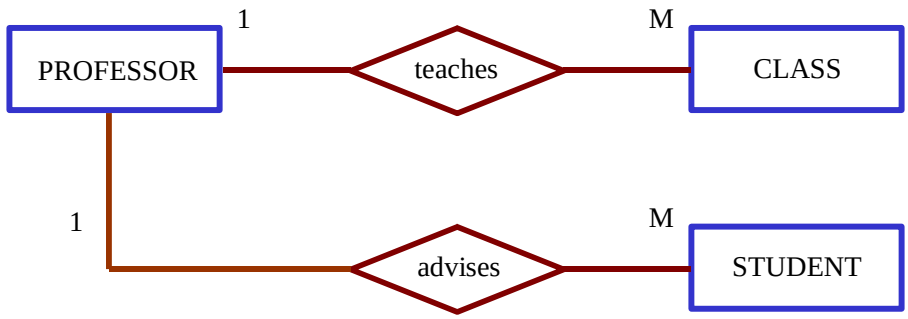
We would create three tables:

Table name	**Table components**
PAINTER	PTR_NUMBER, PTR_NAME, PTR_PHONE
PAINTING	PTG_NUMBER, PTG_TITLE, PTR_NUMBER, GAL_NUM
GALLERY	GAL_NUM, GAL_NAME, GAL_ADDRESS

b. How might the (independent) tables be related to one another?

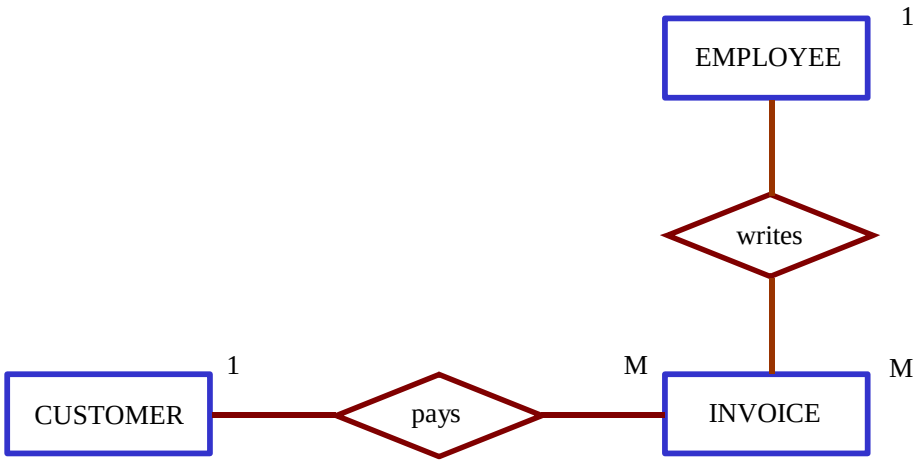
The PAINTING table will be related to both the GALLERY and PAINTER tables. The PAINTING table will contain the attribute PTR_NUMBER, which will relate it to the PAINTER table. The PAINTING table will also contain the GAL_NUM attribute, which will relate it to the GALLERY where the painting is being shown.

7. Describe the relationships shown in the ERD in the figure below.



These relationships can be described this way: One professor teaches many classes. Each class is taught by one professor. (Note that the relationship between PROFESSOR and CLASS is 1:M.) One professor advises many students. Each student has one advisor. (Note that the relationship between PROFESSOR and STUDENT is 1:M.)

8. Describe the relationships shown in the ERD in the figure below.



Each employee writes many invoices. Each invoice is written by one employee. (Therefore, there exists a 1:M relationship between EMPLOYEE and INVOICE.) Each customer pays many invoices. Each invoice is paid by one customer. (Therefore, there exists a 1:M relationship between CUSTOMER and EMPLOYEE.)