1. How many records (rows of raw data) does the above table store, and how many fields (columns or attributes) are in each record? (2 Pts)

   7 rows
   5 column attributes

2. What problem would you encounter if you wanted to list the records in order of the manager's last name, or if you sometimes wanted to omit the first name or middle name in a display or printout? This design fault is referred to as a **composite attribute**. Show the table structure of an altered table that will correct this problem? Show all columns and rows of raw data in this revised table. (2 Pts)

   The first, middle and last name are all in a single field making them all part of a composite attribute for name.

   Therefore before sorting by last name we would probably want to recreate/redesign the table columns as follows:

   Column Fields – PROJECT_CODE
   PROJECT_MANAGER_LAST_NAME
   PROJECT_MANAGER_FIRST_NAME
   MANAGER_PHONE
   MANAGER_ADDRESS
   PROJECT_BID_PRICE

The newly revised table with data should look something like this:

PROJECT_CODE	PROJECT_MANAGER_FIRST_NAME	PROJECT_MANAGER_LAST_NAME	MANAGER_PHONE	MANAGER_ADDRESS	PROJECT_BID_PRICE
21-5Z	Holly B	Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	16833460
25-2D	Jane D	Grant	615-898-9909	218 Clark Blvd., Nashville, TN 36362	12500000
25-5A	George F	Dorts	615-227-1245	124 River Dr., Franklin, TN 29185	32512420
25-9T	Holly B	Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	21563234
27-4Q	George F	Dorts	615-227-1245	124 River Dr., Franklin, TN 29185	10314545
29-2D	Holly B	Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	25559999
31-7P	William K	Moor	904-445-2719	216 Morton Rd., Stetson, FL 30155	56850000

3. What problem would you encounter if you wanted to list the records in order of the street address, city, state, or zip, or area code? Building upon the improvements that you've already made, show the table structure of an altered table that also corrects this problem? Show all columns and rows in this revised table, including the new ones from Step 2.
   (3 Pts)

   Similarly a redesign would improve the situation for these also composite attributes (address, phone)

   The new column fields should contain at the very least the following:
   MANAGER_STREET_ADDRESS, MANAGER_ADDRESS_CITY, MANAGER_ADDRESS_STATE, MANAGER_ADDRESS_ZIP, MANAGER_AREA_CODE.

   E.g. Revised Table:

PROJECT_CODE	PROJECT_MANAGER_FIRST_NAME	PROJECT_MANAGER_LAST_NAME	MANAGER_PHONE	MANAGER_AREA_CODE	MANAGER_STREET_ADDRESS	MANAGER_CITY_ADDRESS	MANAGER_STATE_ADDRESS	MANAGER_ZIP	PROJECT_BID_PRICE
21-5Z	Holly B	Parker	338-3416	338	3334 Lee Rd.	Gainesville	FL	37123	16833460
25-2D	Jane D	Grant	898-9909	898	218 Clark Blvd.	Nashville	TN	36362	12500000
25-5A	George F	Dorts	227-1245	227	124 River Dr.	Franklin	TN	29185	32512420
25-9T	Holly B	Parker	338-3416	338	3334 Lee Rd.	Gainesville	FL	37123	21563234
27-4Q	George F	Dorts	227-1245	227	124 River Dr.	Franklin	TN	29185	10314545
29-2D	Holly B	Parker	338-3416	338	3334 Lee Rd.	Gainesville	FL	37123	25559999
31-7P	William K	Moor	445-2719	445	216 Morton Rd.	Stetson	FL	30155	56850000

4. What data redundancies do you detect; i.e., what unnecessary repetitions are occurring? How could these redundancies lead to update anomalies, delete anomalies, or insert anomalies? (2 Pts)

The data redundancies in this table fall under the three categories described (update/delete/insert)

Update Anomaly exists in the table when data is entered multiple times for the same manager. This redundancy may create a need to go back and change the data in multiple places for for the same person.

Deletion anomaly is present (not really associated with the redundancy though) in which manager data could be removed from the database when removing a project from the table.

Insert anomaly is present as well in the sense that creating a place for a new manager here would require creating a project for that manager which may or may not actually be the case in reality, but would possibly be required. (Question - could this depend on whether or not null is allowed for Project Code?)

5. Using two relational tables, PROJECT and MANAGER, eliminate the redundancies you identified in Problem 4. Create a ManagerID column in both tables so you can link the two tables with the ManagerID being the primary key in MANAGER and a foreign key in PROJECT. Identify the primary key in each table. With words, show how the two tables join together by a foreign key that references a primary key. A format that would be useful is

Tablename.Columnname references Tablename.Columnname.
Foreign Key *Primary Key*

In this problem, show the column names across the top of each table and the rows of raw data below the column names. The columns must correct all faults (composite attributes and redundancies) that you saw above. (5 Pts)

PROJECT.MANAGER_ID references MANAGER.MANAGER_ID
Foreign Key *Primary Key*

Project Table: PK FK

PROJECT_CODE	MANAGER_ID	PROJECT_BID_PRICE
21-5Z	0001	16833460
25-2D	0002	12500000
25-5A	0003	32512420
25-9T	0001	21563234
27-4Q	0003	10314545
29-2D	0001	25559999
31-7P	0004	56850000

Managers Table:
PK

MANAGER_ID	FIRST_NAME	LAST_NAME	AREA_CODE	PHONE_NUM	STREET	CITY	STATE	ZIP
0001	Holly B	Parker	904	338-3416	3334 Lee Rd.	Gainesville	FL	37123
0002	Jane D	Grant	615	898-9909	218 Clark Blvd.	Nashville	TN	36362
0003	George F	Dorts	615	227-1245	124 River Dr.	Franklin	TN	29185
0004	William K	Moor	904	445-2719	216 Morton Rd.	Stetson	FL	30155

In the 2 tables redundancy has been reduced and all relevant information remains with accuracy here.