For each of the following situations, develop a set of tables in 3NF to model the data. State any assumptions you make.

1. Consider an Investment database that contains data items for a large brokerage company. The database should hold information like Investor’s name, Stock, Amount invested, and Broker information. The brokerage company has many offices. Each broker is associated with one office. Each broker has his or her own phone number and private office within the main office. The following assumptions can be made:
   - Investors may invest in many stocks
   - An Investor has one office with phone and address, and a home address and phone
   - Each investor has only one broker

2. Following is a list of data items needed to do the billing for a telephone company. You are to use the information to generate a set of relations in 3NF to represent the data.
   Customer information: name, address, phone number, base charge, current balance.

   Payments: Date and amount

   Long distance charges: Date of call, phone number called (area code, prefix, number), length of call in minutes, rate class (such as mobile-to-mobile, weekend, etc), rate period (day, evening, etc), message type (collect, calling card, direct dialed, etc), time of call, cost of call.

   Use what you believe to be the best key for each relation.

3. (Comes from exercise 2.8 in text.) You are asked to build an ArtBase, that builds a product for art galleries. The core of this product is the database with a schema that captures all the information that galleries need to maintain. Galleries keep information about artists, their names (which are unique), birthplaces, age, and style of art. For each piece of artwork, the artist, the year it was made, its unique title, its type of art (e.g., painting, lithograph, sculpture, photograph), and its price must be stored. Pieces of artwork are also classified into groups of various kinds, for example, portraits, still lifes, works by Picasso, or works of the 19th century; a given piece may belong to more than one group. Each group is identified by a name (like those just given) that describes the group. Finally, galleries keep information about customers. For each customer, galleries keep that person’s unique name, address, total amount of dollars spent in the gallery (very important!), and the artists and groups of art that the customer tends to like. Design a set of relations in 3NF.