Part (a)

In this assignment you will practice database design. In Part (a) you will begin by working through a number of normalization problems. In Part (b), you will then apply principles of database design to transform your Fun Run-based ER diagram into an Oracle database.

Problem 1 (10 points)

a. In ORACLE, view the table mgreiner.Fall2016Problem1 with a SELECT * statement.
   a. This table shows some data for a cleaning store called SqueakyClean that cleans clothes for other cleaning stores (they call them partner stores) in the regions. Every time a delivery comes in, all items are captured in this table. There is a lot of redundancy, clutter, inconsistencies in the table, so your task is to decompose the table to improve them. Only a small extract of the table is provided, so you need to know the business rules to decompose the tables accordingly.

b. Draw a functional dependency diagram for the table. The following business rules apply:
   a. A delivery is identified by a ticket number which is unique for deliveries.
   b. A delivery has one delivery date (date the delivery is sent from the partnerstore to Squeaky Clean) and one date when the delivery is done (date when all clothes are cleaned and returned to the partner store). On a given date, many deliveries may be delivered or done.
   c. At the end of the month, an invoice is created and a delivery is related to one invoice. An invoice may be related to many deliveries, though. An invoice is identified by an invoice number.
   d. A delivery has one delivery total (sum of all delivery item subtotals).
   e. A partner store is identified by a partner abbreviations (e.g., 'UTC'). For each partner store we will capture the partner store name, city, state, phone, owner first and last name. None of the partner attributes (except for the partner abbreviation) can be assumed to be unique.
   f. Squeaky Clean has contracts with the partner store about the cleaning prices for clothes. For each partner and cleaning item name, one cleaning item contract price is determined.
   g. A delivery may have many items (e.g., Pants, Bed Skirts). For each ticket, the combination of cleaning item name and partner abbreviation will determine the item quantity, item subtotal (item quantity multiplied by the item price), and item price.
   h. Cleaning item contract price and item price are not the same. Cleaning item contract prices may change and only reflect the current contract prices. Thus, the item price will keep the historic item price at the time of the delivery.

c. State the highest normal form this table could be in in its present form (i.e. if the table shown here satisfies 1NF but does not satisfy 2NF, then the answer would be '1NF').

d. Normalize this table through BCNF. Decompose the Problem1 table appropriately. **Name each of the resulting tables with an appropriate name.** Present your results in the following form.
   - TABLE1 (column1, column 2, column 3, …)
   - Here, the table name is followed by column names in parentheses. The primary key attribute(s) is(are) underlined, and the foreign key attribute(s) is (are) in red

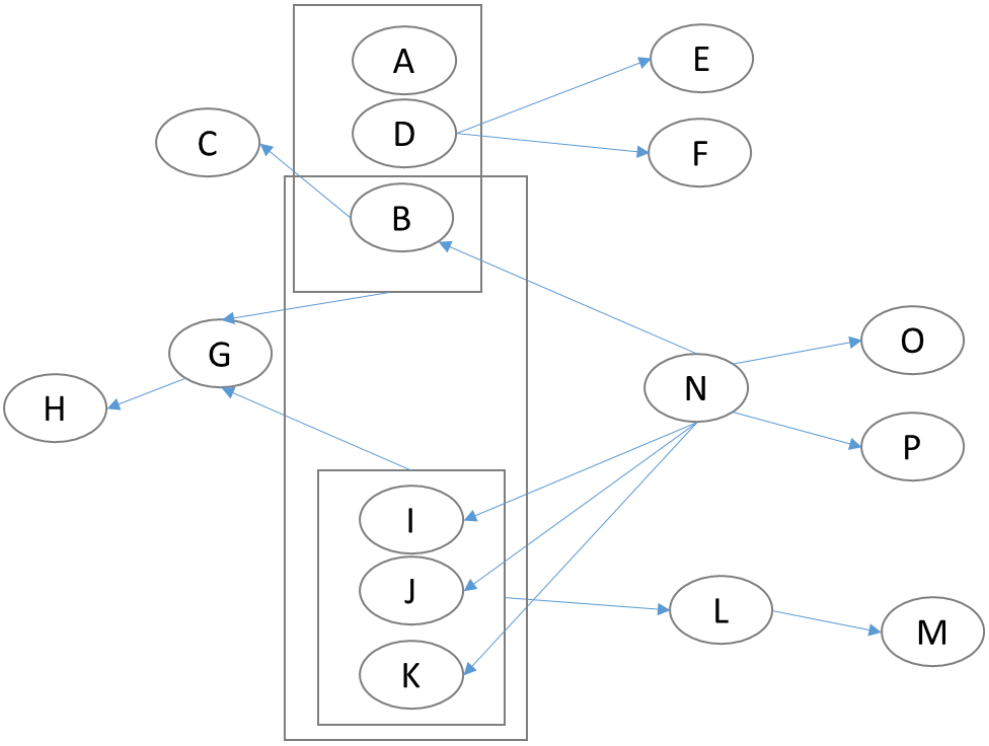
Problem 2 (10 points)

a. In ORACLE, view the table mgreiner.Fall2016Problem2 with a SELECT * statement.
    a. This table provides a small extract of the invoice and payment table.
b. Draw a functional dependency diagram for the table. The following business rules apply:
    a. Each invoice is identified by an invoice number. An invoice is for one particular month, sent on a date to the partner store, for an amount, and has a status (e.g., sent, pending, partially paid).
    b. An invoice goes to one partner store.
    c. A partner store is identified by an abbreviation and has a name. The name cannot be assumed to be unique.
    d. A partner store may receive multiple invoices, one for each month. This means, a partner store will only receive one invoice in a month. This also means, looking up one partner store and one month will produce exactly one invoice.
    e. The partner stores will send in checks to pay for the invoices. Multiple payments may be done for an invoice. A payment is identified by the partner abbreviation and check number.
    f. A payment will have a payment amount and a payment date.
c. State the highest normal form this table could be in in its present form (i.e. if the table shown here satisfies 1NF but does not satisfy 2NF, then the answer would be '1NF').
d. Normalize this table through BCNF. Decompose the Problem1 table appropriately. **Name each of the resulting tables with an appropriate name.** Present your results in the following form.
    - TABLE1 (column1, column 2, column 3, …)
    - Here, the table name is followed by column names in parentheses. The primary key attribute(s) is(are) underlined, and the foreign key attribute(s) is (are) in red

Problem 4 (10 points)

The following is a functional dependency diagram with all meaning stripped out of the attribute names. Assuming that the table it represents is already in 1NF,

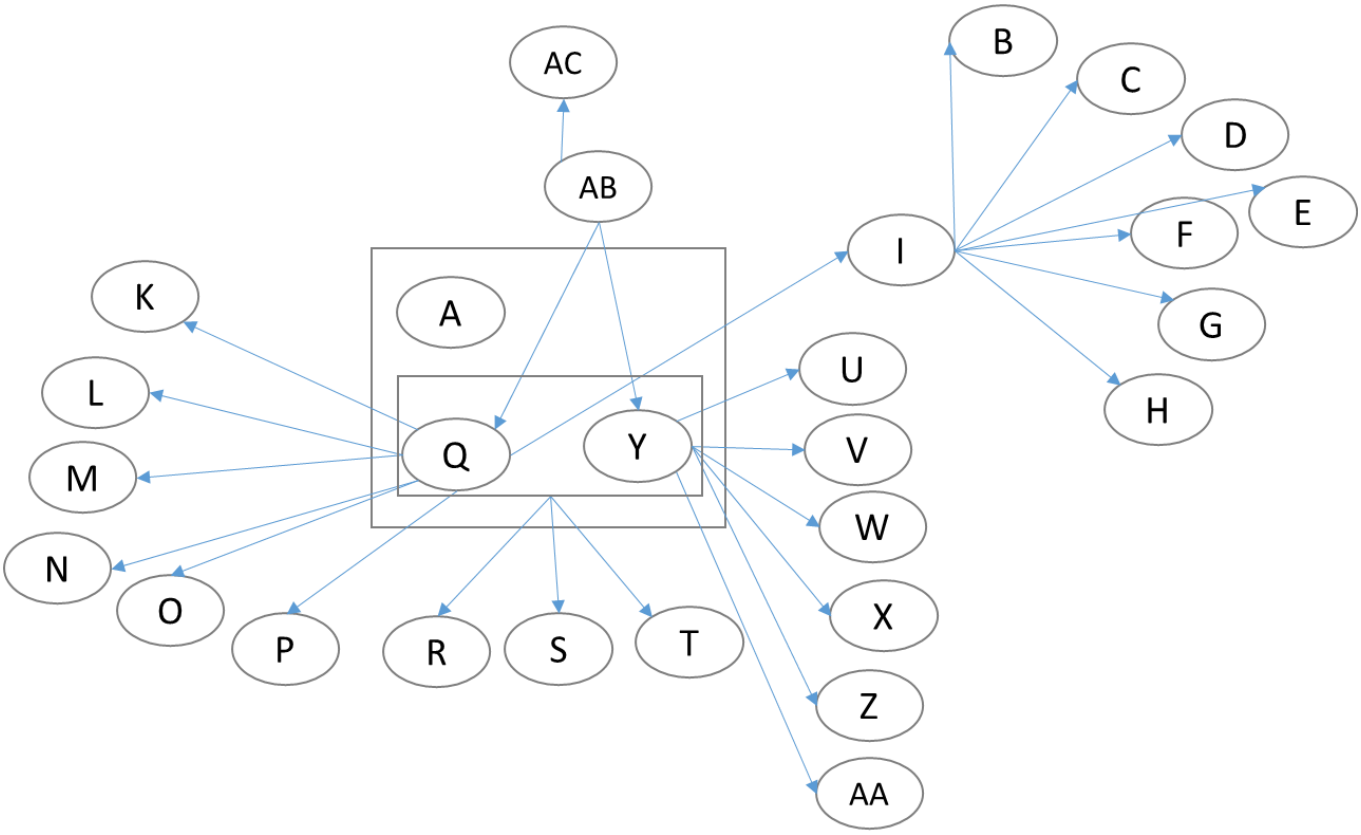
a. Identify any candidate keys. Identify the determinants.
b. Normalize the table/diagram through BCNF. Present your results in the following form. You will not be able to provide meaningful names to the tables, so just call them "TABLE1", "TABLE2", etc.
   - TABLE1 (column1, column 2, column 3, …)
   - Here, the table name is followed by column names in parentheses. The primary key attribute(s) is(are) underlined, and the foreign key attribute(s) is (are) in red



Problem 5 (10 points)

The following is a functional dependency diagram with all meaning stripped out of the attribute names. Assuming that the table it represents is already in 1NF,

c. Identify any candidate keys. Identify the determinants.
d. Normalize the table/diagram through BCNF. Present your results in the following form. You will not be able to provide meaningful names to the tables, so just call them "TABLE1", "TABLE2", etc.
   - TABLE1 (column1, column 2, column 3, …)
   - Here, the table name is followed by column names in parentheses. The primary key attribute(s) is(are) underlined, and the foreign key attribute(s) is (are) in red



Deliverables

- One word or pdf document
- Problem 1 to 2
  - For each problem, your dependency diagram
  - For each problem, statement of highest possible normal form the table is in
  - For each problem, the queries to produce the normalized tables
- Problem 3 to 4
  - For each problem, state the candidate keys
  - For each problem, state the determinants
  - For each problem, write down the normalized tables in the following form
    - TABLE1 (column1, column 2, column 3, …)