PART 3: Relational Database Design Fundamentals

1. What does the following check constraint on the SalesPeople table mean

    ((Salary > 0) AND (Commission = 0)) OR ((Salary = 0) AND (Commission > 0))

This means that SalesPeople will be paid entirely on Salary or Commission not both. If a SalesPerson is being paid a salary they won't get commission and if they are being paid by commission, they won't be paid a salary.

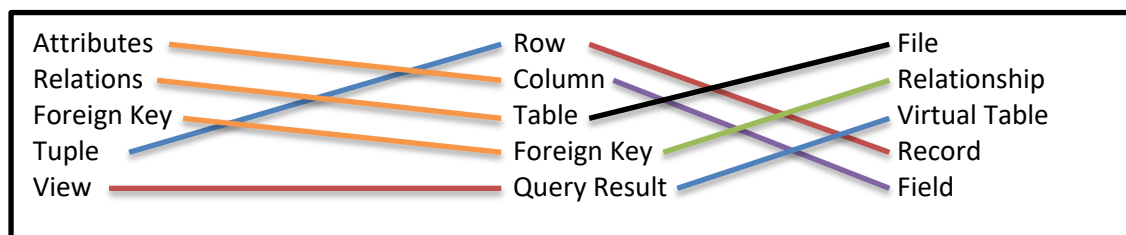2. In Figure 1, draw lines connecting the corresponding terms.

Figure 1

For question 3 through 6, suppose you're a numismatist and you want to track your progress in collecting the 50 states quarters created by the United States Mint. You start with the following table and plan to add more data later (after you take out the trash and finish painting your lead miniatures).

State	Abber	Title	Engraver	Year	Got
Arizona	AZ	Grand Canyon State	Joseph Menna	2008	No
Idaho	ID	Esto Perpetua	Norm Nemeth	2007	No
Iowa	IA	Foundation in Education	John Mercanti	2004	Yes
Michigan	MI	Great Lakes State	Donna Weaver	2004	Yes
Montana	MT	Big Sky Country	Don Everhart	2007	No
Nebraska	NE	Chimney Rock	Charles Vickers	2006	Yes
Oklahoma	OK	Scissortail Flycatcher	Phebe Hemphill	2008	No
Oregon	OR	Crater Lake	Charles Vickers	2005	Yes

Figure 2

3. Is State/Abbr/Title a superkey? Why or why not?

Yes State/Abbr/Title is a superkey; this is because the values in column 'Abbr' are abbreviations to those states in column 'State'. That said the values of the two are not the same. Since Title column values do not replicate they too are a superkey

4. Is Engraver/Year/Got a superkey? Why or why not?

Engraver/Year/Got is not a superkey as the values in Year and Got columns do replicate in a few rows.

What are all of the candidate keys for this table?

- State
- Abbreviation
- Title

6. What are the domains of each of the table's columns?

- State: Names of the fifty U.S States
- Abbrev: Abbreviations of the fifty U.S States
- Title: String that might describe a quarter coin
- Engraver: Artist's names
- Year: Date that if 4 digits only
- Got: 'Yes' or 'No' to state if it has been found

For question 7 through to 10, suppose you are building a dorm room database. Consider the following table. For the historical reasons, all of the rooms in the building have even numbers. The Phone field refers to the number of the phone in the room. Rooms that have no phone cost less but students in those rooms are required to have a cell phone (so you can call them and nag if they miss too many classes).

Rooms	FirstName	LastName	Phone	Cell Phone
100	John	Smith	Null	202-837-2897
100	Mark	Garcia	Null	504-298-0281
102	Anne	Johansson	202-237-2102	Null
102	Sally	Helper	202-237-2102	Null
104	John	Smith	202-237-1278	702-387-3928
106	Anne	Uumellmahaye	Null	504-298-0281
106	Wendy	Garcia	Null	202-839-3920
202	Mike	Hfuhruhurr	202-237-7364	Null
202	Jose	Johansson	202-237-7364	202-839-3920

7. If you don't allow two people with the same name to share a room (due to administrative whimsy) what are all of the possible candidate keys for this table?

FirstName, LastName and Rooms OR FirstName, LastName, Phone and CellPhone are possible candidate keys

8. If you do allow two people with the same name to share a room, what are all of the possible candidate keys for this table?

This scenario will have no candidate keys for this table. Unique Id required for candidate keys to be there.

9. What field-level check constraints could you put on this table's fields? Don't worry syntax for performing the checks, just define them.

- CHECK (Rooms >= 100 && Rooms <900);

10. What table- level check constraints could you put on this table's fields? Don't worry syntax for performing the checks, just define them.
- CHECK (Phone <> null) OR (CellPhone <> null));

PART 4: Understanding User Needs

1. In Figure 3, draw lines connecting the customer roles with their corresponding descriptions.

Customer Role	Description
Convert	Someone who won't be around for long. May be helpful or may not care all that much.
Customer Champion	Answers your questions about the project.
Customer Representative	Anyone who has an interest in the project.
Devil's Advocate	Makes things generally run smoothly. Not glamorous but very useful.
Executive Champion	Provides a reality check and prevents groupthink.
Generic Bad Guy	Ranges from annoying naysayer to malicious saboteur/super villain.
Short-Timer	A user who originally was against your project that you include in the development process to bring them onto your side.
Sidekick/Gopher	The highest ranking customer driving the project. Willing to fight super villains.
Stakeholder	Thoroughly understands the customers' needs. Has the authority to make decisions that stick

Figure 3

2. Which of the following does not describe a use case?
   a. A script for performing some task.
   b. Should describe a realistic operation.
   c. Should cover the customer's entire operation from start to finish.
   d. Should be verifiable

   Answer: c. Should cover the customer's entire operation from start to finish

3. Brainstorming sessions should ideally include:
    a. Customer Representatives.
    b. A Devil's Advocate.
    c. All interested Stakeholders.
    d. All of the above.

    Answer: d. All of the above

4. If a customer says you should use a hierarchical XML database, you should:
    a. Politely say, ''Thank you,'' and ignore this nugget of wisdom.
    b. Ask the customer why he thinks that.
    c. Do as the customer says. (It's his money.)
    d. Study the problem to see if that kind of database makes sense.

    Answer: b. Ask the customer why he thinks that

5. During a visit to view the customers' operation, you see someone repeatedly stamping the front of an order with the current date, turning the order over, turning it over again, and stamping the front with the date again. You should:
    a. Ask someone what that's all about.
    b. Suggest that the manager fire this crazy and possibly dangerous employee.
    c. Ignore the whole issue and stay focused on your own tasks.
    d. Avoid eye contact with this employee at all costs.

    Answer: a. Ask someone what that's all about

6. Look at the ZIP Code lookup form at zip4.usps.com/zip4/welcome.jsp. What are this form's data needs? Which fields are required? (How does the user know those fields are required?) What are the domains for the fields? Which could involve a foreign key validation?

Fields	Required	Domain
Company (optional)	No	Name of organization
Street Address	Yes	Exact address: block number & street address
Apt/Suite/Other	No	Apartment/Suite number/floor
City	Yes	Cities within USA
State	Yes	Valid States within USA
Zip Code	No	4 to 10 digit value

The foreign key could be used for the City in this table with the limited required data. However on other data, using a foreign key could lead to multiple errors in a larger database. Foreign key for city is required as Zip Code is not a mandatory field

7. Which of the following is not a security issue that you should consider when studying the project?
    a. The number of classes of users the database must support.
    b. Whether you need to provide audit trails to record changes to the data.
    c. The frequency with which you need to perform backups.
    d. Whether the users should have individual passwords.

    Answer: c. The frequency with which you need to perform backups

8. You are called upon to design a database for a florist shop named ''Frank's Floral Fantasies.'' Frank thinks that he might want to track the medicinal and homeopathic properties of his plants because he thinks that might improve his sales of Echinacea, St. John's Wort, and other plants. What priority should this requirement get?
    a. Priority 1, definitely in this release.
    b. Priority 2, probably in the next release.
    c. Priority 3, with the unicorns and pixie dust.
    d. It depends (you need more information)

    Answer: d. It depends (you need more information)

9. Write a use case for logging in to your computer's operating system.
- Name: Authorized user only should be allowed to log in
- Brief Description: Correct username and password, leads to access gained
- Actors: -User-> Logging in
            -OS -> Grants access
- Pre-Conditions: No user currently logged in
- Post-Conditions: valid username and password, system logged in. invalid username and password, system remains logged out
- Normal Flow: User must try all possible combinations for Valid, blank and invalid
- Alternative Flow: Click cancel instead of Ok. System will reset, username and password textFields will be reset too
- Notes: If all parameters do no give user access, system must deny access and not allow the user to learn the operations.

10. You're halfway finished designing your database when a Vice Presidential Super Villain says your project is doomed to failure because you didn't include a sufficient allowance for formulistic granulation. You need to cancel the whole thing and start over with him in control. How should you handle this attack?

Use the assistance of the Executive Champion. Ideally he can point to your requirements document and show that you did, in fact, consider formulistic granulation and that everyone agreed the allowance was sufficient. If the Executive Champion does not have the right tools to fight off the super villain, then your database might actually be in serious trouble

PART 5: Extracting Information

1. What is William Door's (MemeberId 13) address?

    Street: *Winding Road*, **City:** *Big City*, **State:** *Mega State*, **Zip Code:** *34512*

2. Which members have surname beginning with the letter 'J'?

FirstName	LastName
John	Jackson
Jack	Johnson
John	Jones
Jenny	Jones

3. Which members joined before December 31, 2004? Order the results by last name and then by first name.

LastName	FirstName
Gee	Steve
Smith	Katie

4. List all the members that attended meeting in Windy Village, Golden State

FirstName	LastName
John	Jones
Jenny	Jones
Katie	Smith