Case study

Quick cart is a grocery delivery service that allows customers to order various grocery items and have them delivered right to their doorstep. Grocery items are categorized into different categories, such as fresh produce, dairy products, pantry staples, household goods, and so forth. Each category has a specific description and storage requirement. Each grocery item has a name, description and price.

Pricing for grocery delivery is structured based on the delivery distance, i.e. less than 10km, 10-20km, or more than 20km. Quick Cart only delivers within a 30km radius from their warehouse.

For each customer, the following information is recorded

* Full name
* E-mail address
* Cellphone number
* Residential address (including street number, street name, suburb, city, province and postal code).

When a customer places an order, the following are recorded:

* Order date
* Order number
* Customer details
* Delivery address (including street number, street name, suburb, city, province and postal code)
* Items in order (Item and quantity ordered)
* Order total price due
* Order status (orderd, out for delivery, delivered, cancelled)

Complete the following tasks in the order listed to complete this assignment:

1. Create a table in the first normal form (1NF) that contains data that can be used to populate the database.
2. Normalise the table presented in the previous step to the second normal form (2NF), showing all steps with explanations. All steps, as well as the final answer, must be in dependency diagram format.
3. Next, extend you answer to nornalise the table created in the previous step to the third normal form (3NF), showing all the steps with explanations. All steps, as well as the final answer, must be in dependency diagram format.
4. Based on your answer in the previous step, as well as the business rules presented in the case study, draw an Entity Relationship Diagram (ERD) using Unified Modelling Language (UML) notation. Your design should be at the logical level – include primary and foreign key fields, and remember to remove any many-to-many relationships
5. What are the key business rules that influence the database design for quick cart?
6. Explain why normalisation is important in the database design process and how it improves data integrity in the quick cart system.
7. Identify potential data anomalies that could arise if the quick cart database was not normalised.
8. Discuss the differences between conceptual, logical and physical database design. How would these apply to quick carrt?
9. What are the advantages and disadvantages of using a relational database for quick cart compared to NoSQL database?  
   Describe the hierarchical, network and relational data models. Why is the relational model best suited for quick cart?