Given these two relations:
CUSTOMER (cust_id, cust_name, cust_address) ORDER (order_id, order_date, cust_id)

Assuming that a customer may have any number of orders and each order is placed by a single customer, discuss the following terms based on the above relations:

1. **Relation** – a set of attributes – CUSTOMER, ORDER

2. **Attribute** – characteristics of a relation - cust_id, cust_name, cust_address; o rder_id, order_date, cust_id

3. **Domain** – attribute must relate to a domain – a list of possible values + data type and format {e.g.: 11/01/2023 and mm/dd/yyyy} - need to have a domain name

4. **Tuple** – a set of values that describe a particular instance of a relation

5. **Degree and cardinality of a relation –**

   Degree: number of attributes of a relation [eg: CUSTOMER – degree is 3; ORDER – degree is 3]

   Cardinality: Number of tuples

6. **Primary key and foreign key:**

   Primary Key: Unique Identifier

   Foreign Key: Primary key in the other relation/ also exists in its own relation (eg: cust_id)

4.1.2 Choosing the Primary key

1.) In any relation, tuples must be unique. However, in many cases, the set of all the attributes in a relation is not considered a candidate key. Why not?
On the other hand, suppose we do have a relation where the set of all attributes is a candidate key. In this case, show that this set must, therefore, be the only candidate key and hence the primary key. Employee (emp_no, emp_name, emp_dob, emptfn)

Super Key: a set of attributes to unique identify (emp_no, emp_tfn)/ (emp_no, emp_name, emp_dob)

Candidate key: minimal super key- superkey that cannot be reduced anyfurther

Example2 – SUPERVISION(student_id,teacher_id)

Superkey- student_id,teacher_id

Candidatekey - student_id,teacher_id

Primarykey- student_id,teacher_id

2.) Identify the primary key and foreign key for these three relations:

ORDER (order_id, order_date, cust_id)

Primary key- order_id

Foreign Key – ~~cust_id~~ we don't know, hence cant assume
ORDERLINE (order_id, prod_no, ol_qtyordered, ol_lineprice)

Primary key – order_id, prod_no (1 primary key with 2 attributes)

Foreign Key – orer_id, prod_no

PRODUCT (prod_no, prod_desc, prod_unitprice)

Primary key- prod_no.

3.) Consider a relation that depicts a dental surgery appointment system.
APPOINTMENT (dentist_id, dentist_name, patient_id, patient_name, appointment_datetime, surgery_roomno)

Identify the superkey(s), candidate key(s) and the primary key for the relation if the following business rules are applicable:

● A dentist can only see a single patient at a particular date and time

Super Key: dentist_id, dentist_name, patient_id, patient_name, appointment_datetime, surgery_roomno

Candidate Key: dentist_id, appointment_datetime

patient_id, appointment_datetime

surgery_room, appointment_datetime

Primary Key: dentist_id, appointment_datetime

                    patient_id, appointment_datetime

                    surgery_room, appointment_datetime

● A dentist treats a patient in a particular surgery room, and
        Super Key: dentist_id, dentist_name, patient_id, patient_name,
appointment_datetime, surgery_roomno

Candidate Key:

Primary Key:

● A patient can see the same dentist multiple times