I. Students can lease university flats and some of the details of leases held by students for places in university flats are shown in Table 1. A place number (placeNo) uniquely identifies each single room in all flats and is used when leasing a room to a student.
(a) Identify the functional dependencies that exist between the columns of the table in Table 1 and identify the primary key and any alternate key(s) (if present) for the table.
(b) Apply normalization to 3NF on Table 1 and get the final relations.
(c) Give DDL statements to create the relations mentioned in (b).

Table 1: tabel displaying

leaseNo	bannerID	placeNo	fName	lName	startDate	finishDate	flatNo	flatAddress
10003	B017706	78	Jane	Watt	01/09/2010	30/06/2011	F56	34 High Street, Paisley
10259	B017706	88	Jane	Watt	01/09/2011	30/06/2012	F78	111 Storrie Road, Paisley
10364	B013399	89	Tom	Jones	01/09/2011	30/06/2012	F78	111 Storrie Road, Paisley
10566	B012124	102	Karen	Black	01/09/2011	30/06/2012	F79	120 Lady Lane, Paisley
11067	B034511	88	Steven	Smith	01/09/2012	30/06/2013	F78	111 Storrie Road, Paisley
11169	B013399	78	Tom	Jones	01/09/2012	30/06/2013	F56	34 High Street, Paisley

II. Consider the following simple forum database, where the primary keys are underlined. The column "create_by" refers to the user who creates the article or comment, while "create_at" refers to the timestamp when the article or comment is created.

forum_user (username, password, age, location)
article (article_id, title, content, create_by, create_at)
comment (comment_id, article_id, content, create_by, create_at)

Write SQL statements to answer the following questions and execute your codes in PostgreSQL. You need to hand in the **statements** as well as the **screenshots** of the results in **"doc" or "pdf"** format.

1. Give a SQL DDL definition of this database. Identify **referential-integrity constraints** that should hold, and include them in the DDL definition. Then construct this database in your PostgreSQL server.
2. Insert the data in Table 2, 3, 4 into the database that you have created.
3. Find the **username, age and location** of the users who never write a comment.
4. For each user, find the number of comments on each article he posts. The table title of result must be (**username, article_title, comment_number**). Order the result according to the **age** of user **in ascending** order and the **"comment_number"** in **descending** order.
5. Find the **usernames** of whom have commented on **all** articles.
6. **Bob** has forgotten his password. Please help him **change** his password to "123456" (i.e., "**md5{e10adc3949ba59abbe56e057f20f883e}**").

7. **John** decides to delete his **first** article. As a DBA, please find the article, **delete** it as well as the comments related to the article. Can you finish this task in **a single statement**? (Note: pay attention to the DDL).

Table 2: forum_user

username	password	age	location
Alice	md5{202cb962ac59075b964b07152d234b70}	20	USA
Bob	md5{250cf8b51c773f3f8dc8b4be867a9a02}	23	UK
David	md5{68053af2923e00204c3ca7c6a3150cf7}	45	USA
John	md5{d2490f048dc3b77a457e3e450ab4eb38}	32	Canada

Table 3: article

article_id	title	content	create_by	create_at
1	Homework	It is easy!	David	2020-03-16 08:58:00
2	Busy	I want more time.	Bob	2020-03-14 12:32:00
3	Hello	This is my first article.	John	2020-03-10 09:13:00
4	No Title	No Content.	John	2020-03-15 10:34:00

Table 4: comment

comment_id	article_id	content	create_by	create_at
1	1	Are you kidding?	Alice	2020-03-16 08:59:00
2	2	Me too.	Alice	2020-03-14 12:40:00
3	3	Welcome!	Alice	2020-03-11 01:03:00
4	4	What?	Alice	2020-03-15 10:38:00
5	1	I don't think so!	John	2020-03-16 09:05:00
6	2	I have time~	David	2020-03-14 13:12:00