Question 1

Use the following five tables to answer all questions in this section. The primary keys are underlined. The foreign keys have the same name as the primary key in another table:

Play(PlayID, Title, Language, DateWritten, AuthorID)
Author(AuthorID, AuthorName, DOB, Nationality)
Theater(TheaterID, TheaterName, City, State, SeatingCapacity)
Performance(TheaterID, PlayID, StartDate, EndDate, Performances, DirectorID)
Director(DirectorID, DirectorName, DOB, Nationality, MentorID)

Assume that a MentorID must match an existing DirectorID. The other field names are self-explanatory.

Write SQL commands to do the following tasks.

1. Output the TheaterName and SeatingCapacity for all theaters in the state of Maine.

SELECT THEATERNAME, SEATINGCAPACITY
FROM THEATER
WHERE STATE = ‘MAINE’

2. Output the TheaterName for all theaters that are in New York State with a seating capacity under 200.

SELECT THEATERNAME
FROM THEATER
WHERE STATE = ‘NEW YORK’ AND SEATINGCAPACITY < 200

3. Output the average seating capacity of all theaters in Vermont.

SELECT AVG(SEATINGCAPACITY)
FROM THEATER
WHERE STATE = ‘VERMONT’

4. Output every state and the average seating capacity of a theater in that state.

SELECT STATE, AVG(SEATINGCAPACITY)
FROM THEATER
GROUP BY STATE
5. Output the name of all authors who wrote a play in 1683.

```sql
SELECT AUTHORNAME
FROM AUTHOR, PLAY
WHERE AUTHOR.AUTHORID = PLAY.AUTHORID
AND TO_NUMBER(TO_CHAR(DateWritten, 'YYYY')) = 1683
```

6. Output the theater name, play title, start date, and end date for all plays written by William Shakespeare.

```sql
SELECT THEATERNAME, TITLE, STARTDATE, ENDDATE
FROM AUTHOR, PLAY, THEATER, PERFORMANCE
WHERE AUTHOR.AUTHORID = PLAY.AUTHORID
AND PLAY.PLAYID = PERFORMANCE.PLAYID
AND PERFORMANCE.THEATERID = THEATER.THEATERID
AND AUTHORNAME = 'WILLIAM SHAKESPEARE'
```

7. Output the name, nationality, and date of birth for all directors and authors.

```sql
SELECT AUTHORNAME, NATIONALITY, DOB
FROM AUTHOR
UNION
SELECT DIRECTORNAME, NATIONALITY, DOB
FROM DIRECTOR
```

8. Output the names of all directors and the name of their mentor.

```sql
SELECT D.DIRECTORNAME, M.DIRECTORNAME
FROM DIRECTOR D, DIRECTOR M
WHERE D.MENTORID = M.DIRECTORID
```

9. Output the names of all directors who have never directed a play written by William Shakespeare.

```sql
SELECT DIRECTORNAME
FROM DIRECTOR
WHERE DIRECTORID NOT IN
(SELECT DIRECTORID
FROM PERFORMANCE, PLAY, AUTHOR
WHERE AUTHOR.AUTHORID = PLAY.AUTHORID
AND PLAY.PLAYID = PERFORMANCE.PLAYID
AND AUTHORNAME = 'WILLIAM SHAKESPEARE')
```
Question 2

Map the following E-R diagram into a set of relations:

CUSTOMER(NAME, EMAIL, DOB)
BET(NAME, CARD_NUMBER, TEAM_ID, GAME_ID, AMOUNT)
CREDIT_CARD(CARD_NUMBER, CARD_TYPE, EXPIRATION_DT)
GAME(GAME_ID, DATE, TIME, STADIUM, HOME_TEAM_ID, HOME_TEAM_SCORE, AWAY_TEAM_ID, AWAY_TEAM_SCORE)
TEAM(TEAM_ID, COUNTRY, REGION, GROUP, MANAGER)
Question 3

Map the following EER diagram into a set of relations:

PERSON (PERSONID, NAME, DOB, GENDER, NATIONALITY)

DIRECTOR (PERSONID, COLLEGE)

ACTOR (PERSONID, POPULARITY)

STUNT_PEOPLE (PERSONID, STAGEFIGHTING)

VIDEO (VIDEOID, VIDEOTITLE, VIDEORUNTIME, POSTERPICURE, PERSONID) – note that PERSONID is the director.

FICTION (VIDEOID, SCREENWRITER)

DOCUMENTARY (VIDEOID, COUNTRY, ISSUE)

INJURY (PERSONID, INJURYNUM, DATE, SEVERITY, BODYPART)

ACTS (VIDEOID, PERSONID)

PERFORMS_STUNTS (VIDEOID, PERSONID)
Question 4.

Consider the following table (primary key is underlined):

\[(A, B, C, D, E, F, G, H, I)\]

There exist the following set of additional functional dependencies:

\[A \rightarrow C\]
\[B \rightarrow F, G, H, I\]
\[G \rightarrow H\]
\[H \rightarrow I\]

What is the normal form of the original table?

1NF

If the normal form is not 3NF, convert the table into a set of 3NF tables.

\[(A, C)\]
\[(B, F, G)\]
\[(A, B, D, E)\]
\[(G, H)\]
\[(H, I)\]