(The answers are written in BLUE, the rest is mainly explanation to the answer)

COMP211 Database Design
Solution for Class Practice 7.2 Normalization

The table shown below lists dentist/patient appointment data.

- A patient is given an appointment at a specific time and date with a dentist located at a particular surgery.
- A patient can only have one appointment at a specific date.
- On each day of patient appointments, a dentist is allocated to a specific surgery for that day.

Illustrate the process of normalization by converting the table shown to Boyce-Codd Normal Form (BCNF). State any assumptions you make about the data shown in this table.

staffNo	*dentistName*	*patNo*	*patName*	*appointment*		*surgeryNo*
				Date	*Time*	
S1011	Tony Smith	P100	Gillian White	12/09/2016	10:00	S15
S1011	Tony Smith	P105	Jill Bell	12/09/2016	12:00	S15
S1024	Helen Pear	P108	Ian MacKay	12/09/2016	10:00	S10
S1024	Helen Pear	P108	Ian MacKay	14/09/2016	14:00	S10
S1032	Robin Plevin	P105	Jill Bell	14/09/2016	16:30	S15
S1032	Robin Plevin	P110	John Walker	15/09/2016	18:30	S13

UNF

Appointment (staffNo, dentistName, patNo, patName, appointmentDate,
appointmentTime, surgeryNo)

UNF to 1NF: To remove repeating groups

The given table is already in 1NF because there is no repeating data.

*The format of the **1NF relations** is as follows:*
Appointment (staffNo, dentistName, patNo, patName, appointmentDate,
appointmentTime, surgeryNo)

1NF to 2NF: To remove partial dependencies

Partial dependencies:
patNo → patName

(The answers are written in BLUE, the rest is mainly explanation to the answer)

*The format of the resulting **2NF relations** is as follows:*
Patient (patNo, patName)
Appointment (staffNo, dentistName, patNo, appointmentDate, appointmentTime, surgeryNo)

2NF to 3NF: To remove transitive dependencies
Transitive dependency from Appointment relation:
staffNo → dentistName

*The format of the resulting **3NF relations** is as follows:*
Staff (staffNo, dentistName)
Patient (patNo, patName)
Appointment (staffNo, patNo, appointmentDate, appointmentTime, surgeryNo)

3NF to BCNF: To remove functional dependencies where the determinant is not a candidate key

The Staff and Patient relations are already in BCNF as all the determinants are candidate keys.

For Appointment Relation, the following functional dependency exists where the determinant is NOT a candidate key:
staffNo, appointmentDate -> surgeryNo

*The format of the resulting **BCNF relations** is as follows:*
Staff (staffNo, dentistName)
Patient (patNo, patName)
StaffLocation (staffNo, appointmentDate, surgeryNo)
Appointment (staffNo, patNo, appointmentDate, appointmentTime)