

**COMP211 Database Design**  
**Class Practice 6 Functional Dependencies**

Student ID: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

The table shown 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.

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

State whether each of the following functional dependency is correct or not?

(1) StaffNo, AppointmentDate  $\rightarrow$  SurgeryNo (Yes)

(2) StaffNo, PatNo, ~~SurgeryNo~~  $\rightarrow$  DentistName, PatName, ~~AppointmentDate~~, ~~AppointmentTime~~ (No)  
For example, given (S1024, P108, S10), two appointment dates and time will be returned.

(3) PatNo, AppointmentDate  $\rightarrow$  StaffNo, DentistName, PatName, AppointmentTime, SurgeryNo (Yes)

(4) StaffNo, AppointmentDate  $\rightarrow$  DentistName, ~~PatNo~~, ~~PatName~~, ~~AppointmentTime~~, SurgeryNo (No)

What is the primary key for this relation?

(PatNo, AppointmentDate)

The table shown above is susceptible to update anomalies. Provide an example for each of insertion, deletion, and modification anomalies.

*Deletion Anomaly:*

*If we delete the details of the dentist “Helen Pear”, we also lose the appointment details of the patient called “Ian MacKay”.*

*Insertion anomalies:*

- To insert a new patient that makes an appointment with the designated dentist, we need to enter the correct detail for the staff. For example, to insert the details of new patient in

*patientNo, patientName and an appointment, we must enter the correct details of the dentist (staffNo, dentistName).*

- *To enter new dentist data that doesn't have appointments to be assigned, we can't insert successfully because NULL values for the primary key is NOT allowed (entity integrity).*

*Modification anomalies:*

*With redundant data, when we want to change the value of one columns of a particular Dentist, for example the dentistName, we must update all the Dentist records that assigned to the particular patient otherwise the database will become inconsistent.*

*In fact, in the end, the design should like the following to avoid the anomalies:*

<i>StaffNo</i>	<i>DentistName</i>
S1011	Tony Smith
S1024	Helen Pear
S1032	Robin Plevin

<i>PatNo</i>	<i>PatName</i>
P100	Gillian White
P105	Jill Bell
P108	Ian MacKay
P110	John Walker

<i>StaffNo</i>	<i>PatNo</i>	<i>Appointment</i>	
		<i>Date</i>	<i>Time</i>
S1011	P100	12/09/2016	10:00
S1011	P105	12/09/2016	12:00
S1024	P108	12/09/2016	10:00
S1024	P108	14/09/2016	14:00
S1032	P105	14/09/2016	16:30
S1032	P110	15/09/2016	18:30
S1032	P110	12/09/2016	18:30

<i>StaffNo</i>	<i>Appointment Date</i>	<i>SurgeryNo</i>
S1011	12/09/2016	S15
S1024	12/09/2016	S10
S1024	14/09/2016	S10
S1032	14/09/2016	S15
S1032	15/09/2016	S13