A) Update Anomalies

Insertion Problems:

- We can't add a new dentist if they don't have appointments yet because we'd need to put NULL values for patient info and appointment details.
- Same problem with adding a new patient who hasn't made an appointment.

Deletion Problems:

- If we delete John Walker's appointment, we might lose information about Robin Plevin (if she had only 1 patient yet).
- Also we will loose surgery S13 if we delete John Walker's appointment.

Update Problems:

- If Helen Pearson changes her name, we have to update it in multiple places (row 3 and 4). Same for patient names.
- If surgery S15 moves to a new location, we'd need to update this in rows 1, 2, and 5.

B) Functional Dependencies

1. staffNo → dentistName (each staff number has only one dentist name)
2. patNo → patName (each patient number has only one patient name)
3. staffNo, date → surgeryNo (a dentist works at one surgery on a given day)
4. staffNo, date, time → patNo (only one patient can see a dentist at a specific time)
5. patNo, date, time → staffNo (a patient can only see one dentist at a specific time)

Assumptions:

- Each dentist has their own staff number
- Each patient has their own patient number
- A dentist can't have two appointments at the same time
- A patient can't have two appointments at the same time

C) Normalization to 3NF

Table is already in first normal form. To fix these problems, we need to split the table into smaller tables:

- **Step 2 (2NF):** We need to remove things that don't depend on the *whole* primary key. Partial dependencies need to be removed.

Dentist Table

staffNo	dentistName
S1011	Tony Smith
S1024	Helen Pearson
S1032	Robin Plevin

Patient Table

patNo	patName
P100	Gillian White
P105	Jill Bell
P108	Ian MacKay
P110	John Walker

Appointment Table

patNo	appointmentDate	time	staffNo
P100	12-Sep-13	10.00	S1011
P105	12-Sep-13	12.00	S1011
P108	13-Sep-13	10.00	S1024
P108	14-Sep-13	14.00	S1024
P105	14-Sep-13	16.30	S1032
P110	15-Sep-13	18.00	S1032

- **Step 3 (3NF):** Now we look for dependencies between non-key things. Transitive dependencies need to be removed.

We can isolate surgery assignments:

Surgery Assignment Table

staffNo	appointmentDate	surgeryNo
S1011	12-Sep-13	S15
S1024	13-Sep-13	S10
S1024	14-Sep-13	S10
S1032	14-Sep-13	S15
S1032	15-Sep-13	S13

Final tables in 3NF:

1. **Dentist Table**
    a. staffNo, dentistName
    b. Primary key: staffNo
2. **Patient Table**
    a. patNo, patName
    b. Primary key: patNo
3. **SurgeryASsignment Table**
    a. staffNo, date, surgeryNo
    b. Primary key: staffNo, date
    c. Foreign key: staffNo connects to Dentist table
4. **Appointment Table**
    a. staffNo, date, time, patNo
    b. Primary key: staffNo, date, time
    c. Foreign keys:
        i. staffNo links to Dentist table
        ii. patNo links to Patient table
        iii. staffNo, date links to DentistSchedule table