Task 1. Will the conversion to BCNF be dependency preserving in any case? Proof your statement and give a reasoning for choosing BCNF design.

Task 2. Given table in 1NF, convert to 3NF if PK is (UnitID, StudentID):

UnitID	StudentID	Date	Tutor ID	Topic	Room	Grade	Book	TutEmail
U1	St1	23.02.03	Tut1	GMT	629	4.7	Deumlich	tut1@fhbb.ch
U2	St1	18.11.02	Tut3	GIn	631	5.1	Zehnder	tut3@fhbb.ch
U1	St4	23.02.03	Tut1	GMT	629	4.3	Deumlich	tut1@fhbb.ch
U5	St2	05.05.03	Tut3	PhF	632	4.9	Dümmlers	tut3@fhbb.ch
U4	St2	04.07.03	Tut5	AVQ	621	5.0	SwissTopo	tut5@fhbb.ch

Solution:

UnitID	StudentID	Dr_Id	Grade	Teaches_Id
U1	St1	Dr1	4.7	T_1
U2	St1	Dr2	5.1	T_2
U1	St4	Dr1	4.3	T_1
U5	St2	Dr3	4.9	T_3
U4	St2	Dr4	5.0	T_4

Date_Room_Id	Date	Room
Dr1	23.02.03	629
Dr2	18.11.02	631
Dr3	05.05.03	632
Dr4	04.07.03	621

Teaches_Id	SubjectID	TutorId
T_1	Subj1	Tut1
T_2	Subj2	Tut3
T_3	Subj3	Tut3
T_4	Subj4	Tut5

SubjectID	Topic	Book
Subj1	GMT	Deumlich
Subj2	Gln	Zehnder
Subj3	PhF	Dümmlers
Subj4	AVQ	SwissTopo

TutorID	**TutEmail**
Tut1	tut1@fhbb.ch
Tut3	tut3@fhbb.ch
Tut5	tut5@fhbb.ch

Task 3. Given table in 1NF, convert to 2NF if PK is {ProjectName, ProjectManager}, use decomposition:

ProjectName	**ProjectManager**	Position	**Budget**	TeamSize
Project1	Manager1	CTO	1 kk $	15
Project2	Manager2	CTO2	1.5 kk $	12

Solution:

ProjectName	**ProjectManager**
Project1	Manager1
Project2	Manager2

ProjectManager	Position	Team size
Project1	CTO	15
Project2	CTO2	12

ProjectName	Budget
Project1	1 kk $
Project2	1.5 kk $

Task 4. Given table, convert to 3NF if PK is Group, use decomposition:

Faculties have a number of specialities, each speciality consists of a set of particular groups.

Faculty -> Speciality -> Group

Group	Faculty	Speciality
g1	**f1**	**s1**
g2	**f2**	**s2**

Solution:

GroupId	Group name	SpecialityId
g1	Group #1	s1
g2	Group #2	s2

SpecialityId	Speciality name	FacultyId
s1	Inf Systems	f1
s2	Comp Software and engineering	f1

FacultyId	Faculty name
f1	FIT
f2	BS

Task 5. Given table, convert to BCNF if PK is {ProjectID, Department}, use decomposition:

Curator depends on projectID and related departments, teamSize directly relates to project and related departments, ProjectGroupsNumber depends on TeamSize.

ProjectID	Department	Curator	TeamSize	ProjectGroupsNumber
p1	d1	e1	100	5
p2	d2	e2	120	6

Solution:

ProjectID	Curator	TeamID
p1	e1	T_1
p2	e2	T_2

TeamID	TeamSize	ProjectGroupsNumber
T_1	100	5
T_2	120	6

Curator_id	Department
e1	d1
e2	d2

Task 6. List the three design goals for relational databases, and explain why each is desirable. Give an example of both desirable and undesirable types of decompositions.

The three design goals are lossless-join decompositions, dependency preserving decompositions, and minimization ofrepetition of information. They are desirable so we can maintain an accurate database, check correctness of updates quickly, and use the smallest amount of space possible.