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

We can't preserve dependencies in any case with BCNF.

There are no non-trivial functional dependencies in BCNF, because we don't have any partial dependencies. It saves memory. And we don't need to use null values for some cases.

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

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

StudentID	UnitID	TutorID	Date	Grade	Room
St1	U1	Tut1	23.02.03	4.7	629
St1	U2	Tut3	18.11.02	5.1	631
St4	U1	Tut1	23.02.03	4.3	629
St2	U5	Tut3	05.05.03	4.9	632
St2	U4	Tut5	04.07.03	5.0	621

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

UnitID	Topic	Book
U1	GMT	Deumlich
U2	GIn	Zehnder
U5	PhF	Dümmlers
U4	AVQ	SwissTopo

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

ProjectName	Budget	TeamSize
Project1	1 kk $	15
Project2	1.5 kk $	12

ProjectManager	Position
Manager1	CTO
Manager2	CTO2

ProjectName	ProjectManager
Project1	Manager1
Project2	Manager2

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.

Group	Faculty	Speciality
g1	f1	s1
g2	f2	s2

Speciality	Faculty
s1	f1
s2	F 2

Group	Speciality
g1	s1
g2	s2

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

ProjectID	Department	Curator	Team_id
p1	d1	e1	T1
p2	d2	e2	T2

Team_id	TeamSize	ProjectGroupsNumber
T1	100	**5**
T2	120	**6**

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.

Goal for a relational database design is:
• Minimization information repetitions
• Lossless join.
• Dependency preservation

They are desirable because we can maintain an accurate database, check correctness of updates quickly, and use the smallest amount of space possible.