#1

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

BCNF is not always dependency preserving.

A 3NF table which does not have multiple overlapping candidate keys is said to be in BCNF, it is has more strict rules than 3NF. In BCNF, every non prime attribute should be functionally dependent on any of super key in schema.

#2

Given table in 1NF, convert to 3NF if PK is UnitID, StudentID:

UnitID	StudentID	Grade
U1	St1	4.7
U2	St1	5.1
U1	St4	4.3
U5	St2	4.9
U4	St2	5.0

UnitID	Topic	Book
U1	GMT	Deumlich
U2	Gln	Zehnder
U5	PhF	Dummlers
U4	AVQ	SwissTopo

UnitID	Date	Room	TutorID
U1	23.02.03	629	Tut1
U2	18.11.02	631	Tut3
U5	05.05.03	632	Tut3
U4	04.07.03	621	Tut5

TutorID	TutEmail
Tut1	Tut1@fhbb.ch
Tut3	Tut3@fhbb.ch
Tut5	Tut5@fhbb.ch

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

ProjectName	ProjectManager
Project1	Manager1
Project2	Manager2

ProjectName	Budget
Project1	1 kk $
Project2	1.5 kk $

ProjectManager	Position	TeamSize
Manager1	CTO	15
Manager2	CTO2	12

#4

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

Faculty	Speciality
F1	S1
F2	S2

Speciality	Group
S1	G1
S2	G2

#5

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

ProjectId	Department	Curator	TeamId
P1	D1	E1	T1
P2	D2	E2	T2

TeamID	TeamSize	ProjectGroupsNumber
T1	100	5
T2	120	6

#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 desirable design goals for relational database schema are

- lossless-join decompositions
- dependency preserving decompositions
- minimization of repetition 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.