Task 1

BCNF is not always dependency preserving.

In BCNF every non prime attribute should be functionally dependent on any of super key in schema.

$$R = (A, B, C)$$

functional dependency $B \rightarrow C$ and

$$A, C \rightarrow B$$

R is not in BCNF, B is not superkey

Any decomposition of R willn't include all the attributes in $A, C \rightarrow B \Rightarrow$ composition not be dependency preserving

Task 2

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	Gln	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	Date	TutorID	Topic	Grade
St1	U1	23.02.03	Tut1	GMT	4.7

St1	U1	23.02.03	Tut1	GMT	4.7
St1	U2	18.11.02	Tut3	Gln	5.1
St4	U1	23.02.03	Tut1	GMT	4.3
St2	U5	05.05.03	Tut3	PhF	4.9
St2	U4	04.07.03	Tut5	AVQ	5.0

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

UnitID	Topic	Room
U1	GMT	629
U2	Gln	631
U1	GMT	629
U5	PhF	632
U4	AVQ	621

Task 3

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

ProjectName	Manager_ID
Project1	Manager_id1
Project2	Manager_id2

Manager_ID	ProjectManager	Position
Manager_id1	Manager1	CTO
Manager_id2	Manager2	CTO2

Task 4

Group	Faculty	Speciality
g1	f1	s1
g2	f2	s2

Group	Speciality
g1	s1
g2	s2

Speciality	Faculty
s1	f1
s2	f2

Task 5

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

ID	ProjectID	Department	Curator
Id1	p1	d1	e1
Id2	p2	d2	e2

ID	Team_id	TeamSize
Id1	T1	100
Id2	T2	120

Team_id	ProjectGroupsNumber
T1	5
T2	6

Task 6

The 3 design goals are :

1) lossless-join decompositions

2) dependency preserving decompositions

3) minimization of repetition of info

Example:

$$R = (A, B, C)$$

$$F = \{ A \rightarrow B$$
$$\qquad B \rightarrow C \}$$

$$KEY = \{ A \}$$

R is not in BCNF

Decomposition $R_1 = (A, B)$, $R_2 = (B, C)$

R_1 and R_2 in BCNF

Lossless join decomposition

Dependency preserving.