1-a. Your company is wanting to update the database for Akdeniz University. The table shown below displays some details of courses and teachers.

Dept	Dept Name	Faculty Name	Faculty Email	Course ID	Course Name	Section	Instructor	Instructor Email	Course Capacity
CSE	Computer Engineering	Melih GUNAY	melihgunay	CSE204	Database	A	Joseph LEDET	josephledet	50
CSE	Computer Engineering	Murat AK	murratak	CSE204	Database	A	Joseph LEDET	josephledet	50
CSE	Computer Engineering	Joseph LEDET	josephledet	CSE204	Database	A	Joseph LEDET	josephledet	50
CSE	Computer Engineering	Melih GUNAY	melihgunay	CSE102	Intro to Java II	A	Murat AK	murratak	60
CSE	Computer Engineering	Murat AK	murratak	CSE102	Intro to Java II	A	Murat AK	murratak	60
CSE	Computer Engineering	Joseph LEDET	josephledet	CSE102	Intro to Java II	A	Murat AK	murratak	60
CSE	Computer Engineering	Melih GUNAY	melihgunay	CSE102	Intro to Java II	B	Joseph LEDET	josephledet	60
CSE	Computer Engineering	Murat AK	murratak	CSE102	Intro to Java II	B	Joseph LEDET	josephledet	60
CSE	Computer Engineering	Joseph LEDET	josephledet	CSE102	Intro to Java II	B	Joseph LEDET	josephledet	60
MAT	Mathematics	Ali CIBRA	alicibra	MAT114	Differential Equations	A	Ali CIBRA	alicibra	100

a. Identify the functional dependencies that exist between the columns of the table and identify the primary key and any alternate key(s) (if present) for the table.

b. Describe why the table is not in 3NF.

c. The table is susceptible to update anomalies. Provide examples of how insertion, deletion, and modification anomalies could occur on this table.

1-b. Applying normalization to 3NF on the table shown above results in the formation of the three 3NF tables shown below.

Faculty Email	Course ID	Section
melihgunay	CSE204	A
murratak	CSE204	A
josephledet	CSE204	A
melihgunay	CSE102	A
murratak	CSE102	A
josephledet	CSE102	A
melihgunay	CSE102	B
murratak	CSE102	B
josephledet	CSE102	B
alicibra	MAT114	A

a. Identify the functional dependencies that exist between the columns of each table below and identify the primary key and any alternate and foreign key(s) (if present) for each table.

b. Describe why storing the university data across four 3NF tables avoids the update anomalies described in 1-a.

c. Describe how the original table shown above can be re-created through relational joins between primary key and foreign keys columns of the tables below. Write the queries.

Course

CourseID	Course Name	Course Capacity	FK_Dept
CSE204	Database	50	CSE
CSE102	Intro to Java II	60	CSE
MAT114	Differential Equations	100	MAT

Department

Dept	DeptName
CSE	Computer Engineering
MAT	Mathematics

Faculty

FacultyEmail	FacultyName	FK_Dept
melihgunay	Melih GUNAY	CSE
murratak	Murat AK	CSE
josephledet	Joseph LEDET	CSE
alicibra	Ali CIBRA	MAT

Section

FK_Course	FK_Faculty	Section
CSE204	josephledet	A
CSE102	murratak	A
CSE102	josephledet	B
MAT114	alicibra	A

Potential Solutions

1-a.

1. Dept ->Dept Name
   Faculty Email ->Faculty Name
   Course ID ->Course Name
   Course ID, Section ->Instructor, Instructor Email, Course Capacity

2. There are partial dependencies and transitive dependencies

3. Any example that would mean redundant data could be changed in one place but not others

1-b.

1. Unnamed table - no dependencies, PK is all three columns
   Department - A ->B; Dept is PK
   Course - E ->F, J, A; CourseID is PK, FK_Dept is FK
   Faculty - D ->C, A; FacultyEmail is PK, FK_Dept is FK
   Section - E, G ->D1; FK_CourseID, Section is PK, FK_CourseID is FK

2. Anything meaning redundant data is no longer an issue

3. A query that joins the five tables