

## Part 1:

### Task 1.1

#### Relation A)

Superkey - any set containing a unique attribute.

1. {EmpID, SSN}, {EmpID, Email}, {Name, Email}, {Name, Email, Department}, {EmpID, Salary, Phone}, {Email, Phone}

2. Candidate keys – any unique column, candidate for a primary key.

EmpID, Email, Phone, SSN(Social Security Number).

3. EmpID, because of permanence(People could change their phones and email addresses) and also it is visually easier to use in the small data sets.

4. The data in the table is unique, however it is technically possible so Yes. Roommates could share a same phone or employees might share an office phone as well.

#### Relation B)

1. We can leave out Grade and Credits. So the answer is 5. The set is {StudentID, CourseCode, Section, Semester, Year,}

Deleting any of these attributes can lead to duplicate rows.

2. StudentID – multiple students could take same courses.

CourseCode – multiple courses could have same section values(1, 2, 3 or A, B, C).

Section – Same courses could be taken by multiple students in different semesters.

Semester – Same section of a same course could be taken by the same student in the same year. So defining semester is important.

Year – for example: Fall 25 and Fall 26 could take the same data.

3. I think no.

## Task 1.2

Enrollment.StudentID > Student.StudentID

Enrollment.CourseID > Course.CourseID

Department.DepCode > Course.DepartmentCode

Professor.Department > Department.DeptName

Student.AdvisorID > Professor.ProfID

Course.DepartmentCode > Department.DeptCode

## Part 2:

### Task 2.1

1. Strong; Patient, Doctor, Department

Weak: Hospital Rooms, Prescription, Appointment, Contact

2. Patient:

Composite: Name, Birthday, Address

Multi-Valued: Phone, Address

Derived: Age, Insurance date

Doctor:

Composite: Name, Office Location

Multi-Valued: Specialization, Phone Number

Derived: Age

Hospital Rooms:

Derived: distance

Appointments:

Composite: Date, Time

Multivalued: Patient, Purpose of visit

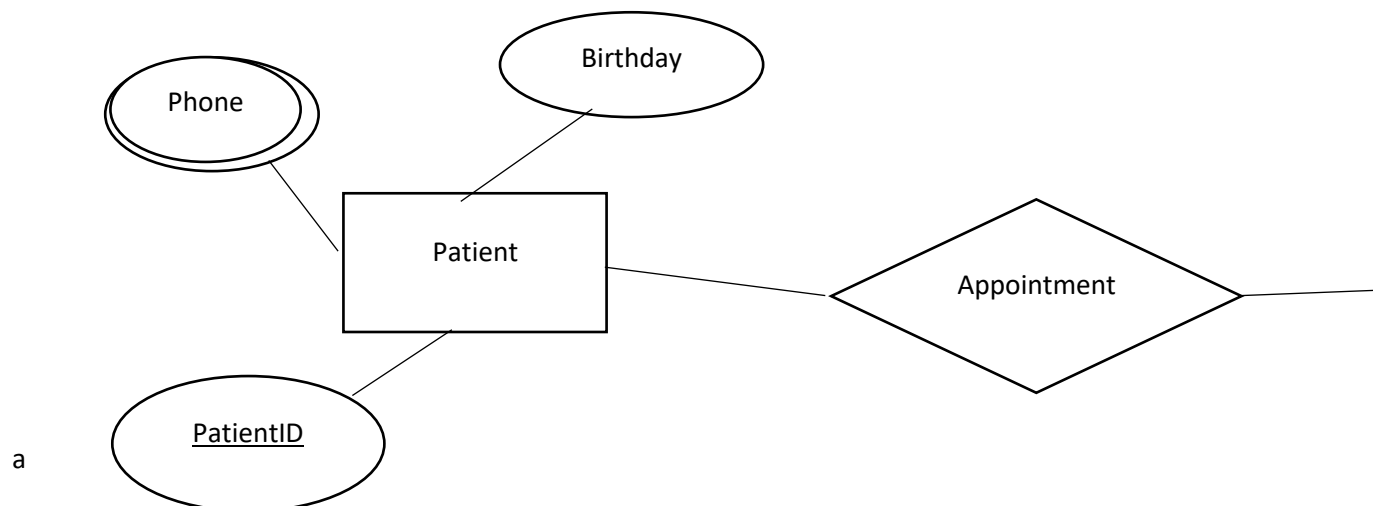
Derived: How much time left till the closest appointment

3.

1:1 – Department – Hospital Room

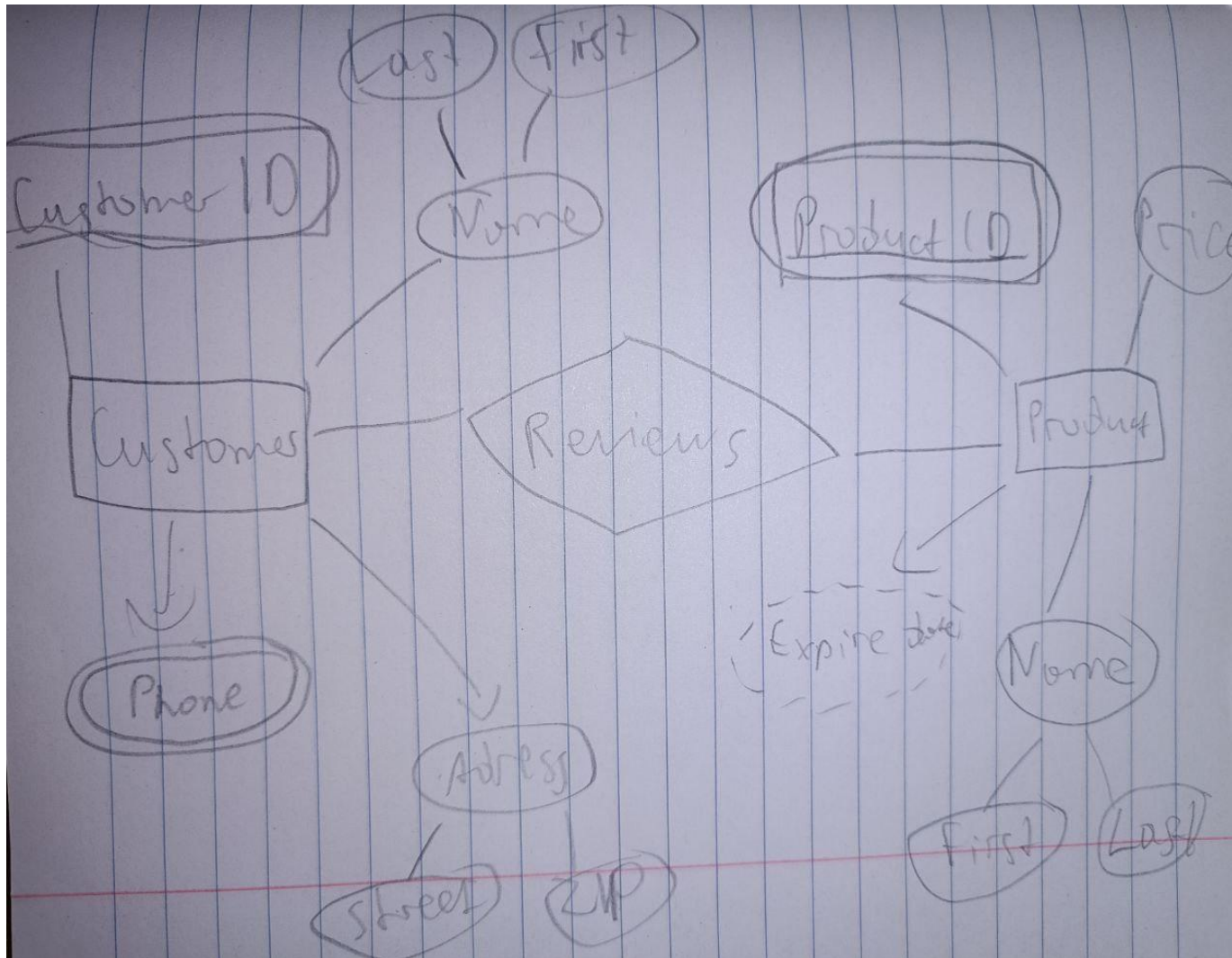
1:N – Patient-Appointment, Doctor-Appointment

M:N – Doctor – Specialization



## Task 2.2

1.



2. OrderItem – Depends on the order and needs OrderID to exist.

3. Customer – Product, many customers could order many products. Attributes: CustomerID, ProductID, Review, Rating

## Part 4:

### Task 4.1

1. StudentID  $\rightarrow$  StudentName, StudentMajor, Role ProjectID  $\rightarrow$  ProjectTitle, ProjectType, StartDate, Enddate, HoursWorked SupervisorID  $\rightarrow$  SupervisorName, SupervisorDept
2. If a student works on multiple projects, their name and major are repeated.
3. Role attribute could have multiple data
4. Student(StudentID, StudentName, StudentMajor, Role) Project(ProjectID, ProjectTitle, ProjectType) Supervisor(SupervisorID, SupervisorName, SupervisorDept) Relation(StudentID, ProjectID, SupervisorID, StartDate, Enddate, Hoursworked)
5. Student(StudentID, StudentName, StudentMajor, Role) Project(ProjectID, ProjectTitle, ProjectType) Supervisor(SupervisorID, SupervisorName, SupervisorDept) Assignment(StudentID, ProjectID, SupervisorID, StartDate, EndDate, HoursWorked)

### Task 4.2

1. (CourseID, TimeSlot, Room)
2. StudentID  $\rightarrow$  StudentMajor (each student has exactly one major)  
  
CourseID  $\rightarrow$  CourseName (each course has a fixed name)  
  
InstructorID  $\rightarrow$  InstructorName (each instructor has exactly one name)  
  
Room  $\rightarrow$  Building (rooms are unique across campus, so a room determines the building)
3. StudentID  $\nrightarrow$  StudentMajor, StudentID is not a superkey (Student can have multiple courses)
4. Student(StudentID PK, StudentMajor)  
  
Course(CourseID PK, CourseName)  
  
Instructor(InstructorID PK, InstructorName)  
  
RoomInfo(Room PK, Building)

Section(CourseID, TimeSlot, Room PK, InstructorID)

Enrollment(StudentID, CourseID, TimeSlot, Room PK)