1. [21 marks] Design a conceptual data model for the given scenario.

a) Construct an ER diagram in UML. The diagram should show all entities, attributes of each entity, and relationships between the entities with appropriate multiplicity constraints.

**Guest**

name

email

diatryRequirements

**CaD Event**

date

time

grade

**Student**

SID

name

streetAddress

city

postcode

phoneNumber

Hosts > < Participates in

1..6

1..\*

1..1

1..1

0..\*

v Hosted in

1..1

**Kitchen**

building

room

1..1

1..1

**Chef**

CID

name

phoneNumber

email

qualification

^ Hosted in

0..\*

**Training Session**

date

time

Participates in > < Teaches at

1..1

1..\*

1..4

b) State any assumptions necessary to resolve ambiguities in the scenario. Pay special attention to cardinalities and participation constraints.

For the cardinality, the following assumptions had been made:

* Students will host Cook and Dine events without a supervisor present
* Kitchens do not have to have a training session or Cook and Dive event
* A friend of a student (guest) will not have their data stored until they are attending a Cook and Dine event

Other Assumptions:

* Training sessions of the same date, time and kitchen cannot occur as they overlap
* Training sessions of the same student cannot have the same times as they would overlap
* If there is a training session, the chef allocated can make the time
* If there is a training session, the chef allocated is not double booked

2. [23 marks] Produce a logical data model for a relational database.

a) Map your conceptual data model (Task 1) to a relational schema, indicating clearly the primary keys and any foreign keys introduced to model the relations and constraints. Represent the schema in textual form.

**Schema Key:**

Underline = Primary Key

*Italics* = Foreign Key

Student (SID, name, streetAddress, city, postcode, phoneNumber)

CaD Event (date, time, grade(A/B/C/D/E/F), *SID*, *building*, *room, gname1, gname2, gname3, gname4, gname5, gname6*)

Training Session (date, time, *SID*, *CID*, *building*, *room*)

Kitchen (building, room)

Chef (CID, name, phoneNumber, email, qualification(Certificate/Associates Degree/Bachelor/Master/None))

Guest (name, email, diatryRequirements)

**Relation Key:**

attribute1 (entity1) = attribute2 (entity2)

Means the attribute of entity 1 refers to the attribute of entity 2.

**Foreign Key Definitions:**

gnameX (CaD Event) = name (Guest)

**Explanation:**

6 gname attributes occur as a friend can go to as many CaD events as they want meaning the events cannot be listed under their own name as multiple entities would need to be created and so to simplify, 6 gnames are made

b) For each foreign key, specify whether a null value would be allowed. Justify your choice.

gname1 cannot be null however gname2-6 can be as there must be at least one guest to a cook and dine event but more may occur.

building and room cannot be null as training sessions and Cook and Dine events must be hosted somewhere

SID and CID cannot be null as a student and chef must be present for training sessions and a student must be present for the Cook and Dine event

c) State any other required constraints for your logical data model.

Constraints:

* sid is a string of format ‘Sxxxx’ where x refers to a digit, cannot be null and is unique
* name, building, streetAddress, city, building and room are all strings that cannot be null and do not have to be unique
* postcode is a string of format ‘ATXT XAA’ where a is letter and x is a digit and T being an additional a or x or nothing, cannot be null and does not have to be unique
* phoneNumber is an integer of format ‘0xxxxxxxxxx’ where x refers to a digit, cannot be null and is unique
* cid is a string of format ‘Cxxxx’ where x refers to a digit, cannot be null and is unique
* date is an integer of format ’DD-MM-YYYY’ where DD must be 31 or less, MM must be 12 or less and a positive value, cannot be null and does not have to be unique
* time is an integer of format ’HH-MM’ where HH must be 23 or less and MM must be 59 or less and a positive value, cannot be null and does not have to be unique
* email is a string of format ‘X@X.X’ where x refers to a string of any length, cannot be null and does not have to be unique