# Homework 2 Normalisation

# 1. A boat hire company stores details of its customers, boats and rentals in a database. The relations in the database hold the following data:

#  Boat (BoatName, type, length, berths)

#  Customer (CustomerID, Surname, Firstname, AddressLine1, AddressLine2, Town, Postcode, DateOfBirth, email)

#  BoatHire (CustomerID, BoatName, HireDate, HireEndDate)

#  (a) The key in the BoatHire relation consists of three attributes.

#  What is the name given to a key made up of more than one attribute? [1]

#  (b) The relations in this database are in Third Normal Form.

#  State the properties of a relation in Third Normal Form. [3]

 (c) State, with reasons, why it is important that relations in a database are in
Third Normal Form. [6]

 (d) Complete the Entity-Relationship diagram below to show the degree of the relationships between the entities. [3]



2. A database is to be created to hold data about students at a Sixth Form College and the subjects they study.

 Students study a number of subjects, and each subject has one subject leader.

 The table below is a first attempt at the design of the database.

| StudentID | Name | TutorGroup | Tutor | Subject | Level | SubjectLeader |
| --- | --- | --- | --- | --- | --- | --- |
| S1000 | Bella | 2 | CKE | HistoryGeographyEconomics | AAAS | AJHBJGCKE |
| S2000 | Jane | 3 | KPR | EnglishFrenchRussian | ASAA | DREFJFKPR |
| S3000 | Greg | 1 | DRE | EnglishGeography | AA | DREBJG |

 (a) Explain, with reference to the data, why the table is not in First Normal Form (1NF). [2]

 (b) The design is changed to:

 Student (StudentID, Name, TutorGroup, Tutor)

 StudentSubject (StudentID, Subject, Level, SubjectLeader)

 Show how the data given in the table above would be held in these two tables. [3]

 Table: **Student**

| StudentID | Name | TutorGroup | Tutor |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

 Table: **StudentSubject**

| StudentID | Subject | Level | SubjectLeader |
| --- | --- | --- | --- |
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|  |  |  |  |

 (c) A student is not allowed to study the same subject at A and AS Level. [1]

 What is the primary key of the table StudentSubject?

 (d) The two tables Student and StudentSubject are related. Explain how this is achieved using a primary and a foreign key. [2]

 (e) Explain why the table StudentSubject is not in Second Normal Form (2NF). [2]

 (f) Explain why the table Student is not in Third Normal Form (3NF) [2]

 [Total 25 Marks]