Question 1

Draw an ER diagram containing the Customer and the Test entity types connected by a 1:M identifying relationship between Customer and GeneticTest. GeneticTest is a weak entity. Choose an appropriate relationship name. Define minimum cardinalities so that a Customer must have at least one GeneticTest and a GeneticTest is for exactly one Customer. For the Customer entity type, add attributes CustomerID (primary key), Password, and Email. For the GeneticTest entity type, add attributes TestName (primary key), TestDate, and Results.

Then extend the ERD with the Lab entity type and a 1:M relationship named PerformedAt between Lab and GeneticTest. Each Genetic Test must be performed at exactly one Lab, and a Lab will perform many GeneticTests. Assume that a Lab must have performed at least one GeneticTest. For the Lab entity type, add attributes LabID (primary key), LabName, and LabAddress.

Then extend the ERD with a self-referencing M:N relationship named Contact between Customers. Assume that a Customer need not Contact any other Customers, and a Customer need not be contacted by any other Customers. The attributes of this relationship include ContactDate and ContactMessage.
Question 2

Draw an ER diagram that models a town’s Public Works Department. Make note of any assumptions you make.

Each employee has a name, phone, address, city, state, and zip.

There are both regular and temporary employees.

For regular employees, we keep track of their date hired and yearly salary. For temporary employees, we keep track of the length of the their current contract and their hourly wage.

We keep track of each job the Public Works Department does. We keep track of the date a job starts, the date a job finished, and the location of the job.

We also keep track of which employees have been assigned to the job. An employee can be assigned to many jobs, and each job can have many employees assigned to it.

We also keep track of the supervisor of each job. A supervisor must be a regular employee. Not all regular employees have been supervisors. A regular employee can supervise many jobs. Each job has exactly one supervisor.

We also keep track of the residents of the town – we keep track of their names and addresses.

We keep track of the complaints that residents make about the jobs. Not all residents make complaints, but some make many complaints. Not all jobs generate complaints, but some generate many complaints. For each complaint, we keep track of the date and the content of the complaint.
Question 3

Convert the following ER diagram into a set of tables.

Project(\text{ProjectID}, \text{Title}, \text{Purpose}, \text{Cost}, \text{StartDate}, \text{EndDate}, \text{OrgID})

Organization(\text{OrgID}, \text{Name}, \text{Address}, \text{City}, \text{State}, \text{ZipCode})

StatusReport(\text{ProjectID}, \text{ReportDate}, \text{MoneySpent}, \text{Comment})

Employee(\text{SSN}, \text{Name}, \text{DOB}, \text{Payment}, \text{Address}, \text{City}, \text{State}, \text{ZipCode})

LocalGovt(\text{OrgID}, \text{Population}, \text{OrgLevel})

College(\text{OrgID}, \text{NumberFaculty}, \text{NumberStudent})

SmallBusiness(\text{OrgID}, \text{CorpStatus}, \text{DateOfInc})

WorksFor(\text{SSN}, \text{OrgID})