Project Part 1

Question 1

Part A)
Main Entity Types
1. Clinic
2. Staff Member
3. Pet
4. Owner
5. Examination

Part B & C)

Main Entity 1	Relationship Name	Main Entity 2	Multiplicity	Relationship Type
Clinic	Employs	StaffMember	1..*	One to Many
StaffMember	worksAt	Clinic	1..1	
StaffMember	Manages	Clinic	0..1	One to One
Clinic	managedBy	StaffMember	1..1	
Owner	Owns	Pet	1..*	One to Many
Pet	isOwnedBy	Owner	1..1	
Pet	registeredTo	Clinic	1..1	One to Many
Clinic	Has	Pet	1..*	
StaffMember	Performs	Examination	1..*	One to Many
Examination	performedBy	StaffMember	1..1	
Pet	getsExamined	Examination	1..*	One to Many
Examination	isDoneTo	Pet	1..*	

Part D)
Main Entity Attributes
1. Clinic
   a. ClinicNo (Primary Key)
   b. Name
   c. Address

         d. PhoneNo
2. StaffMember
         a. StaffNo (Primary Key)
         b. Name
         c. Address
         d. PhoneNo
         e. DOB
         f. Position
         g. Salary
3. Pet
         a. PetNo (Primary Key)
         b. Name
         c. DOB
         d. Species
         e. Breed
         f. Color
4. Owner
         a. OwnerNo (Primary Key)
         b. Name
         c. Address
         d. PhoneNo
5. Examination
         a. ExamNo (Primary Key)
         b. ChiefComplaint
         c. Description
         d. DateSeen
         e. ActionTaken

Part E)
Primary & Candidate Keys
    Noted next to attributes in section D above. There are no other alternative keys.

Part F)
Uploaded in separate file called ConceptualER

Project Part 2

Question 2

Part A)

StaffMember (StaffNo, Name, Address, PhoneNo, DOB, Position, Salary, ClinicNo) **Primary Key:** (StaffNo) **Foreign Key:** ClinicNo **references** Clinic(ClinicNo)	**Manager** (StaffNo, ClinicNo) **Foreign Keys:** StaffNo **references** StaffMember(StaffNo) ClinicNo **references** Clinic(ClinicNo)
Clinic (ClinicNo, Name, Address ,PhoneNo) **Primary Key:** (ClinicNo)	**Owner** (OwnerNo, Name, Address, PhoneNo) **Primary Key:** (OwnerNo)
Pet (PetNo, Name, DOB, Species, Breed, Color, OwnerNo, ClinicNo) **Primary Key:** (PetNo) **Foreign Keys:** OwnerNo **references** Owner(OwnerNo) ClinicNo **references** Clinic(ClinicNO)	**Examination** (ExamNo, CheifComplaint, Description, DateSeen, ActionTaken, StaffNo, PetNo) **Primary Key:** (ExamNo) **Foreign Keys:** StaffNo **references** StaffMember(StaffNo) PetNo **references** Pet(PetNo)

Part B)
Each relation is in 3NF form since there are no transitive dependencies within them.
Since all relations are in 3NF, the logical model is valid.

Part C)
User Transaction Examples (Assuming Tables Contain Some Data):
1. INSERT INTO Manager VALUES (001, 003)
    a. Inserts a manager with the StaffNo 001 for the Clinic with a ClinicNo of 003. The insert doesn't work if there is already a manager for the Clinic with a ClinicNo of 003 or the StaffMember with a StaffNo of 001 is already managing a Clinic, this is due to the UNIQUE constraint as seen in Part D.
2. DELETE FROM StaffMember WHERE StaffNo = 001
    a. This would delete the data of the StaffMember with a StaffNo of 001. It will also remove the tuple in Manager that references a StaffNo of 001 if it exists due to the DELETE CASCADE constraint shown later in Part D. It will not delete any tuples in Examination that reference the StaffNo of 001 because if a StaffMember

is removed (fired) the examination still occurred, rather it will set the staffNo to NULL to allow the delete command to proceed.

3. INSERT INTO Owner VALUES (041, 'Jonathan Smith', '123 Sesame St', 1234567890)
   a. This inserts a new tuple into Owner if there is no pre-existing Owner tuple with the value of 041 as the OwnerNo.
4. INSERT INTO Pet VALUES (523, 'Fido', '2019-03-20', 'Canis familiaris', 'Beagle', 'Brown and Black', 002, 12)
   a. Inserts a new Pet as long as a Clinic with ClinicNo of 12 and an Owner with OwnerNo of 002 exist, as well as if there is no Pet with PetNo 523 that exists.
5. DELETE FROM Clinic WHERE ClinicNo = 001
   a. Removes the Clinic tuple where ClinicNo is 001. Due to the ON DELETE CASCADE constraint on ClinicNo when it is being used as an FK, all StaffMember, Pet, and Manager tuples that reference the ClinicNo of 001 will also be deleted. If a StaffMember that is referenced in a tuple of Examination is deleted, the StaffNo for that Examination tuple will be set to NULL due to the ON DELETE SET NULL constraint placed on the StaffNo FK in the Examination relation.

Part D)

Required Data and Attribute Domain Constraints
StaffMember: StaffNo **PRIMARY KEY, INT, NOT NULL, CHECK > 0** Name **VARCHAR(255)** Address **VARCHAR(255)** PhoneNo **INT CHECK** DOB **DATE** Position **VARCHAR(255)** Salary **INT** ClinicNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0**
Manager: StaffNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0, UNIQUE** ClinicNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0, UNIQUE**
Clinic ClinicNo **PRIMARY KEY, INT, NOT NULL, CHECK > 0** Name **VARCHAR(255)** Address **VARCHAR(255)** PhoneNo **INT**
Owner OwnerNo **PRIMARY KEY, INT, NOT NULL, CHECK > 0** Name **VARCHAR(255)** Address **VARCHAR(255)** PhoneNo **INT**

Pet
      PetNo **PRIMARY KEY, INT, NOT NULL, CHECK > 0**
      Name **VARCHAR(255)**
      DOB **DATE**
      Species **VARCHAR(255)**
      Breed **VARCHAR(255)**
      Color **VARCHAR(255)**
      OwnerNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0**
      ClinicNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0**

Examination
      ExamNo **PRIMARY KEY, INT, NOT NULL, CHECK > 0**
      CheifComplaint **VARCHAR(255)**
      Description **VARCHAR(255)**
      DateSeen **DATE**
      ActionTaken **VARCHAR(255)**
      StaffNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0**
      PetNo **FOREIGN KEY, INT, NOT NULL, CHECK > 0**

Primary Key, Referential/Foreign Key
StaffMember (StaffNo, Name, Address, PhoneNo, DOB, Position, Salary, ClinicNo) **Primary Key:** (StaffNo) **INT NOT NULL** **Foreign Key:**   ClinicNo **references** Clinic(ClinicNo) **ON UPDATE CASCADE ON DELETE CASCADE**

Manager (StaffNo, ClinicNo)
 	
Foreign Keys:
    StaffNo **references** StaffMember(StaffNo) **ON UPDATE CASCADE ON DELETE CASCADE**
    ClinicNo **references** Clinic(ClinicNo) **ON UPDATE CASCADE ON DELETE CASCADE**

Clinic (ClinicNo, Name, Address ,PhoneNo) **Primary Key:** (ClinicNo) **INT NOT NULL**
Owner (OwnerNo, Name, Address, PhoneNo) **Primary Key:** (OwnerNo) **INT NOT NULL**

Pet (PetNo, Name, DOB, Species, Breed, Color, OwnerNo, ClinicNo)
 	
Primary Key: (PetNo) **INT NOT NULL**
 	
Foreign Keys:
    OwnerNo **references** Owner(OwnerNo) **ON UPDATE CASCADE ON DELETE CASCADE**
    ClinicNo **references** Clinic(ClinicNO) **ON UPDATE CASCADE ON DELETE CASCADE**

Examination (ExamNo, CheifComplaint, Description, DateSeen, ActionTaken, StaffNo, PetNo)

Primary Key: (ExamNo) **INT NOT NULL**

Foreign Keys:
      StaffNo **references** StaffMember(StaffNo) **ON UPDATE CASCADE ON DELETE SET NULL**
      PetNo **references** Pet(PetNo) **ON UPDATE CASCADE ON DELETE SET NULL**

Part E)
      The Logical Model ER diagram is in a separate file under the name LogicalER.