Problem Set 2

Total –37.5 Points

Instructions:- This Problem Set covers materials from Chapters 2, 3 and 4.

a. For Problems that require explanations, create space below the question and write your answers.

b. For drawing type problems, you can use MS Word, Lucid Charts, ERD Plus or Visio. Refer to Problem Set 1 for links to access Lucid Charts, ERD Plus or Visio. Be sure to name your files appropriately.

Question 1:- Use the following tables to answer Parts (a) to (c) below:- [9 Points]

Use the database shown in Figure P3.24 to answer Problems. AviaCo is an aircraft charter company that supplies on-demand charter flight services using a fleet of four aircraft. Aircraft are identified by a unique registration number. Therefore, the aircraft registration number is an appropriate primary key for the AIRCRAFT table.

FIGURE P3.24 THE CH03_AVIACO DATABASE TABLES

Table name: CHARTER **Database name: Ch03_AviaCo**

CHAR_TRIP	CHAR_DATE	CHAR_PILOT	CHAR_COPILOT	AC_NUMBER	CHAR_DESTINATION	CHAR_DISTANCE	CHAR_HOURS_FLOWN	CHAR_HOURS_WAIT	CHAR_FUEL_GALLONS	CHAR_OIL_QTS	CUS_CODE
10001	05-Feb-18	104		2289L	ATL	936.0	5.1	2.2	354.1	1	10011
10002	05-Feb-18	101		2778V	BNA	320.0	1.6	0.0	72.6	0	10016
10003	05-Feb-18	105	109	4278Y	GNV	1574.0	7.8	0.0	339.8	2	10014
10004	06-Feb-18	106		1484P	STL	472.0	2.9	4.9	97.2	1	10019
10005	06-Feb-18	101		2289L	ATL	1023.0	5.7	3.5	397.7	2	10011
10006	06-Feb-18	109		4278Y	STL	472.0	2.6	5.2	117.1	0	10017
10007	06-Feb-18	104	105	2778V	GNV	1574.0	7.9	0.0	348.4	2	10012
10008	07-Feb-18	106		1484P	TYS	644.0	4.1	0.0	140.6	1	10014
10009	07-Feb-18	105		2289L	GNV	1574.0	6.6	23.4	459.9	0	10017
10010	07-Feb-18	109		4278Y	ATL	998.0	6.2	3.2	279.7	0	10016
10011	07-Feb-18	101	104	1484P	BNA	352.0	1.9	5.3	66.4	1	10012
10012	08-Feb-18	101		2778V	MOB	884.0	4.8	4.2	215.1	0	10010
10013	08-Feb-18	105		4278Y	TYS	644.0	3.9	4.5	174.3	1	10011
10014	09-Feb-18	106		4278Y	ATL	936.0	6.1	2.1	302.6	0	10017
10015	09-Feb-18	104	101	2289L	GNV	1645.0	6.7	0.0	459.5	2	10016
10016	09-Feb-18	109	105	2778V	MQY	312.0	1.5	0.0	67.2	0	10011
10017	10-Feb-18	101		1484P	STL	508.0	3.1	0.0	105.5	0	10014
10018	10-Feb-18	105	104	4278Y	TYS	644.0	3.8	4.5	167.4	0	10017

The destinations are indicated by standard three-letter airport codes. For example,
STL = St. Louis, MO ATL = Atlanta, GA BNA = Nashville, TN

Table name: AIRCRAFT

AC_NUMBER	MOD_CODE	AC_TTAF	AC_TTEL	AC_TTER
1484P	PA23-250	1833.1	1833.1	101.8
2289L	C-90A	4243.8	768.9	1123.4
2778V	PA31-350	7992.9	1513.1	789.5
4278Y	PA31-350	2147.3	622.1	243.2

AC-TTAF = Aircraft total time, airframe (hours)
AC-TTEL = Total time, left engine (hours)
AC_TTER = Total time, right engine (hours)

In a fully developed system, such attribute values would be updated by application software when the CHARTER table entries were posted.

Table name: MODEL

MOD_CODE	MOD_MANUFACTURER	MOD_NAME	MOD_SEATS	MOD_CHG_MILE
B200	Beechcraft	Super KingAir	10	1.93
C-90A	Beechcraft	KingAir	8	2.67
PA23-250	Piper	Aztec	6	1.93
PA31-350	Piper	Navajo Chieftain	10	2.35

Customers are charged per round-trip mile, using the MOD_CHG_MILE rate. The MOD_SEATS column lists the total number of seats in the airplane, including the pilot and copilot seats. Therefore, a PA31-350 trip that is flown by a pilot and a copilot has eight passenger seats available.

FIGURE P3.24 THE CH03_AVIACO DATABASE TABLES (CONTINUED)

Table name: PILOT **Database name: Ch03_AviaCo**

EMP_NUM	PIL_LICENSE	PIL_RATINGS	PIL_MED_TYPE	PIL_MED_DATE	PIL_PT135_DATE
101	ATP	ATP/SEL/MEL/Instr/CFII	1	20-Jan-18	11-Jan-18
104	ATP	ATP/SEL/MEL/Instr	1	18-Dec-17	17-Jan-18
105	COM	COMM/SEL/MEL/Instr/CFI	2	05-Jan-18	02-Jan-18
106	COM	COMM/SEL/MEL/Instr	2	10-Dec-17	02-Feb-18
109	COM	ATP/SEL/MEL/SES/Instr/CFII	1	22-Jan-18	15-Jan-18

The pilot licenses shown in the PILOT table include the ATP = Airline Transport Pilot and COM = Commercial Pilot. Businesses that operate "on demand" air services are governed by Part 135 of the Federal Air Regulations (FARs) that are enforced by the Federal Aviation Administration (FAA). Such businesses are known as "Part 135 operators." Part 135 operations require that pilots successfully complete flight proficiency checks each six months. The "Part 135" flight proficiency check date is recorded in PIL_PT135_DATE. To fly commercially, pilots must have at least a commercial license and a 2nd class medical certificate (PIL_MED_TYPE = 2.)

The PIL_RATINGS include
SEL = Single Engine, Land
SES = Single Engine (Sea)
CFI = Certified Flight Instructor
MEL = Multi-engine Land
Instr. = Instrument
CFII = Certified Flight Instructor, Instrument

Table name: EMPLOYEE

EMP_NUM	EMP_TITLE	EMP_LNAME	EMP_FNAME	EMP_INITIAL	EMP_DOB	EMP_HIRE_DATE
100	Mr.	Kolmycz	George	D	15-Jun-62	15-Mar-08
101	Ms.	Lewis	Rhonda	G	19-Mar-85	25-Apr-06
102	Mr.	Vandam	Rhett		14-Nov-78	18-May-13
103	Ms.	Jones	Anne	M	11-May-94	26-Jul-17
104	Mr.	Lange	John	P	12-Jul-91	20-Aug-10
105	Mr.	vVilliams	Robert	D	14-Mar-95	19-Jun-17
106	Mrs.	Duzak	Jeanine	K	12-Feb-88	13-Mar-18
107	Mr.	Diante	Jorge	D	01-May-95	02-Jul-16
108	Mr.	vViesenbach	Paul	R	14-Feb-86	03-Jun-13
109	Ms.	Travis	Elizabeth	K	18-Jun-81	14-Feb-16
110	Mrs.	Genkazi	Leighla	vV	19-May-90	29-Jun-10

Table name: CUSTOMER

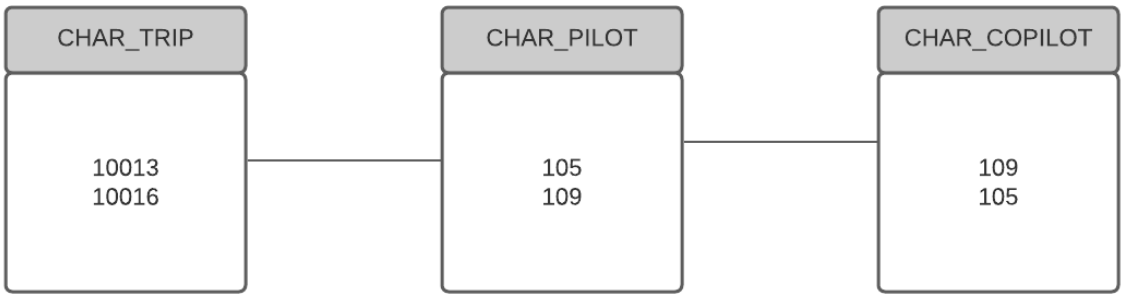
CUS_CODE	CUS_LNAME	CUS_FNAME	CUS_INITIAL	CUS_AREACODE	CUS_PHONE	CUS_BALANCE
10010	Ramas	Alfred	A	615	844-2573	0.00
10011	Dunne	Leona	K	713	894-1238	0.00
10012	Smith	Kathy	W	615	894-2285	896.54
10013	Olowski	Paul	F	615	894-2180	1285.19
10014	Orlando	Myron		615	222-1672	673.21
10015	O'Brian	Amy	B	713	442-3381	1014.56
10016	Brown	James	G	615	297-1228	0.00
10017	Williams	George		615	290-2556	0.00
10018	Farriss	Anne	G	713	382-7185	0.00
10019	Smith	Olette	K	615	297-3809	453.98

The nulls in the CHARTER table's CHAR_COPILOT column indicate that a copilot is not required for some charter trips or for some aircraft. Federal Aviation Administration (FAA) rules require a copilot on jet aircraft and on aircraft that have a gross take-off weight over 12,500 pounds. None of the aircraft in the AIRCRAFT table are governed by this requirement; however, some customers may require the presence of a copilot for insurance reasons. All charter trips are recorded in the CHARTER table

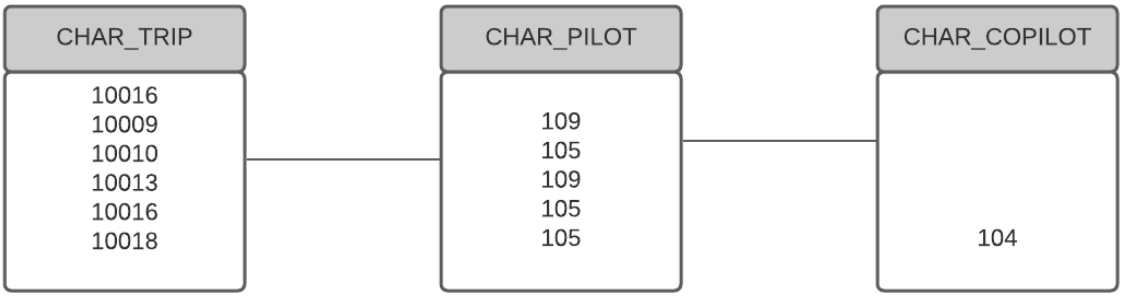
You want to see data on charters flown by either **Robert Williams (employee number 105)** or **Elizabeth Travis (employee number 109)** as pilot or copilot, but not charters flown by both of them. Complete Problems (a) to (c) below to find this information.

a) **Create the table** that would result from applying the **SELECT** relational operator to the CHARTER table to return only the CHAR_TRIP, CHAR_PILOT, and CHAR_COPILOT attributes for charters flown by either employee 105 or employee 109. [3 Points]

b) **Create the table** that would result from applying the SELECT **and** PROJECT relational operators to the CHARTER table to return only the CHAR_TRIP, CHAR_PILOT, and CHAR_COPILOT attributes for charters flown by both employee 105 and employee 109. [3 Points]



c) **Create the table** that would result from applying a DIFFERENCE relational operator of your result from (a) to (c). [3 Points]



[Note:- You **do not** need to write any sql for these questions. Just draw a table to show the resulting records]

Problem 2:- **[14.5 Points]**

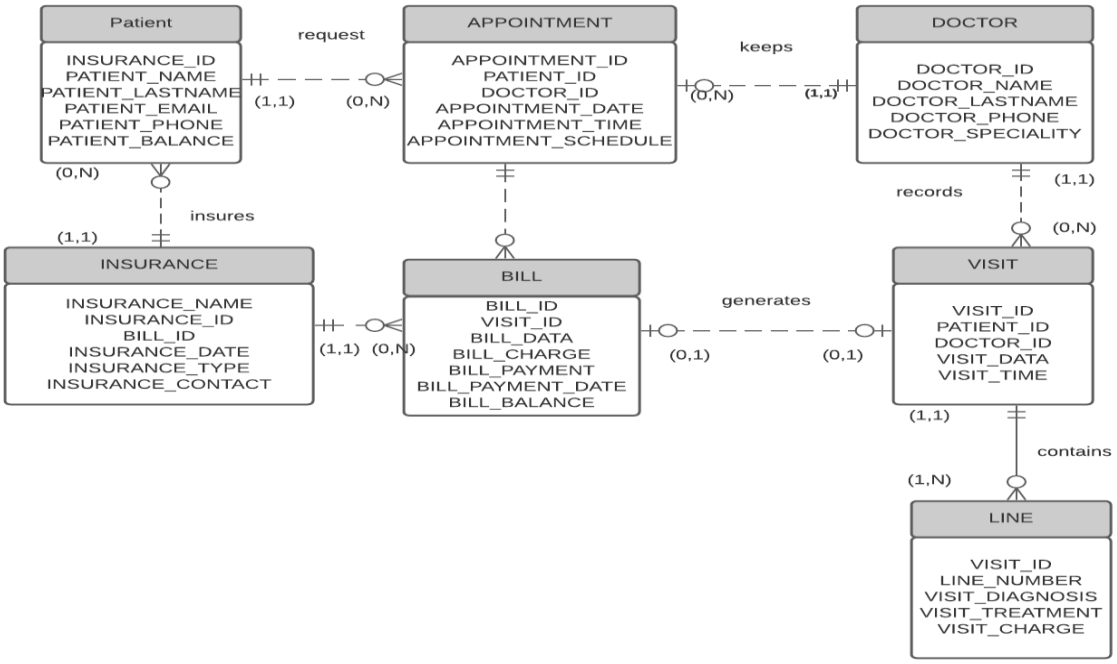
Using the **Crow's Foot notation**, create an ERD that can be implemented for a medical clinic, using the following business rules:-

- A patient can make many appointments with one or more doctors in the clinic, and a doctor can accept appointments with many patients. However, each appointment is made with only one doctor and one patient. **Patient Doctor**
- Emergency cases do not require an appointment. However, for appointment management purposes, an emergency is entered in the appointment book as "unscheduled." **Appointment**
- If kept, an appointment yields a visit with the doctor specified in the appointment. The visit yields a diagnosis and, when appropriate, treatment. **Treatment**
- With each visit, the patient's records are updated to provide a medical history. **Records(medical his.)**
- Each patient visit creates a bill. Each patient visit is billed by one doctor, and each doctor can bill many patients. **Bills (patient = bill, patientBill = 1Doctor, 1Doctor = patien(s) Bill)**
- Each bill must be paid. However, a bill may be paid in many installments, and a payment may cover more than one bill. **Payment (options of installments, 1 payment = multiple bills)**
- A patient may pay the bill directly, or the bill may be the basis for a claim submitted to an insurance company. **Insurance(could cover bill)**
- If the bill is paid by an insurance company, the deductible is submitted to the patient for payment. **Insurance payment finalized**

For maximum scores, make sure to label your entities clearly, include at least the primary and foreign keys and indicate how the entities are related. If you are making any assumptions, include a note at the bottom of your ERD.

Entities = PATIENT, APPOINTMENT, DOCTOR, INSURANCE, BILL, VISIT, LINE

Entities	Relationship	Connectivity	Cardinality	O Entities
PATIENT	Request	0:M	(0,N)	APPOINTMENT
APPOINTMENT		1:1	(1,1)	PATIENT
DOCTOR	Keeps	0:M	(0, N)	APPOINTMENT
INSURANCE	insures	0:M	(0,N)	PATIENT
BILL		0:1	(0,1)	BILL
VISIT	Contains	1:M	(1,N)	LINE
LINE		1:1	(1,1)	VISIT



- Visit and line are almost alike because line is for the process of visit, but I put line as a separate entity.

Question 3:- [14 Points]

Create a **Crow's Foot notation ERD** to support the following business operations:

- A friend of yours has opened Professional Electronics and Repairs (PEAR) to repair smartphones, laptops, tablets, and MP3 players. She wants you to create a database to help her run her business.
- When a customer brings a device to PEAR for repair, data must be recorded about the customer, the device, and the repair. The customer's name, address, and a contact phone number must be recorded (if the customer has used the shop before, the information already in the system for the customer is verified as being current). For the device to be repaired, the type of device, model, and serial number are recorded (or verified if the device is already in the system). Only customers who have brought devices into PEAR for repair will be included in this system.
- Since a customer might sell an older device to someone else who then brings the device to PEAR for repair, it is possible for a device to be brought in for repair by more than one customer. However, each repair is associated with only one customer. When a customer brings in a device to be fixed, it is referred to as a repair request, or just "repair," for short. Each repair request is given a reference number, which is recorded in the system along

with the date of the request, and a description of the problem(s) that the customer wants fixed. It is possible for a device to be brought to the shop for repair many different times, and only devices that are brought in for repair are recorded in the system. Each repair request is for the repair of one and only one device. If a customer needs multiple devices fixed, then each device will require its own repair request.

- There are a limited number of repair services that PEAR can perform. For each repair service, there is a service ID number, description, and charge. "Charge" is how much the customer is charged for the shop to perform the service, including any parts used. The actual repair of a device is the performance of the services necessary to address the problems described by the customer. Completing a repair request may require the performance of many services. Each service can be performed many different times during the repair of different devices, but each service will be performed only once during a given repair request.
- All repairs eventually require the performance of at least one service, but which services will be required may not be known at the time the repair request is made. It is possible for services to be available at PEAR but that have never been required in performing any repair.

- Some services involve only labor activities and no parts are required, but most services require the replacement of one or more parts. The quantity of each part required in the performance of each service should also be recorded. For each part, the part number, part description, quantity in stock, and cost is recorded in the system. The cost indicated is the amount that PEAR pays for the part. Some parts may be used in more than one service, but each part is required for at least one service.

For maximum scores, make sure to clearly label your entities, relations, primary key, foreign key, any weak or strong relations. If there are any M:N relations, create a composite entity to break the M:N into a 1:M or 1:1 relation.

Entities= CUSTOMER, RPAIR, REPAIR_RECORD, DEVICE, SERVICE, PARTS, LABOUR