

Name:- Stewart DulaneyId#:- 1545566Part A:- Multiple Choice

[10 Points]

Circle the letter of the **best choice**.

1. A verb associating two nouns in a business rule translates to a(n) _____ in the data model.
 - a) entity
 - b) attribute
 - c) relationship
 - d) constraint

2. A _____ entity has a primary key that is partially or totally derived from the parent entity in the relationship.
 - a) strong
 - b) weak
 - c) business
 - d) child

3. If Tiny College has some departments that are classified as "research only" and do not offer courses, the COURSE entity of the college database would be _____ the DEPARTMENT entity.
 - a) existence-dependent on
 - b) independent of
 - c) mandatory for
 - d) optional to

4. The first step in building an entity-relationship diagram (ERD) is _____.
 - a) developing the initial ERD
 - b) creating a detailed narrative of the organization's description of operations
 - c) identifying the attributes and primary keys that adequately describe the entities
 - d) identifying the business rules based on the description of operations

5. Which of the following is **true** of business rules?
 - a) They allow the designer to set company policies with regard to data.
 - b) They allow the designer to develop business processes.
 - c) They can serve as a communication tool between the users and designers.
 - d) They provide a framework for the company's self-actualization.

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6. A _____ is the primary key of one table that has been placed into another table to create a common attribute.
- a) superkey
 - b) composite primary key
 - c) candidate key
 - d) foreign key
7. The CUSTOMER table's primary key is CUS_CODE. The CUSTOMER primary key column has no null entries, and all entries are unique. This is an example of _____ integrity.
- a) entity
 - b) referential
 - c) relational
 - d) null
8. According to the "preferably single-attribute" characteristic of a primary key, the primary key:
- a) must be able to guarantee unique attribute values.
 - b) should have the minimum number of attributes possible.
 - c) should have embedded semantic meaning associated with each attribute.
 - d) must be composed of attributes that are free from security risks or violations.
9. The _____ notation of entity-relationship modelling can be used for both conceptual and implementation modelling.
- a) Bachman
 - b) UML
 - c) Chen
 - d) Crow's Foot
10. A derived attribute is indicated in the Chen notation by a _____ that connects the attribute and an entity.
- a) single line
 - b) double line
 - c) dashed line
 - d) double dashed line

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Part B:- Answer all 4 questions in spaces provided.**Question 1:-** Use the database tables shown to answer Problems (a) to (f) below.

Table Name:- EMPLOYEE

EMPLOYEE			
	EMP_CODE	EMP_LNAME	JOB_CODE
[+]	14	Rudell	2
[+]	15	McDade	1
[+]	16	Ruellardo	1
[+]	17	Smith	3
[+]	20	Smith	2

Table Name:- JOB

JOB		
	JOB_CODE	JOB_DESCRIPTION
[+]	1	Clerical
[+]	2	Technical
[+]	3	Managerial

Table Name:- BENEFIT

BENEFIT		
	EMP_CODE	PLAN_CODE
	15	2
	15	3
	16	1
	17	1
	17	3
	17	4
	20	3

Table Name:- PLAN

PLAN		
	PLAN_CODE	PLAN_DESCRIPTION
[+]	1	Term life
[+]	2	Stock purchase
[+]	3	Long-term disability
[+]	4	Dental

Note that the database is composed of four tables that reflect these relationships:-

- An EMPLOYEE has only one JOB_CODE, but a JOB_CODE can be held by many EMPLOYEES.
- An EMPLOYEE can participate in many PLANS, and any PLAN can be assigned to many EMPLOYEES.

Note also that the M:N relationship has been broken down into two 1:M relationships for which the BENEFIT table serves as the composite or bridge entity.

Name:- _____

Id#:- _____

- a) For each table in the database, identify the primary key and the foreign key(s). If a table does not have a foreign key, write **None** in the space provided. [8 Points]

TABLE	PRIMARY KEY(s)	FOREIGN KEY(s)
EMPLOYEE	EMP-CODE	JOB-CODE
BENEFIT	(EMP-CODE, PLAN-CODE)	EMP-CODE, PLAN-CODE
PLAN	PLAN-CODE	None
JOB	JOB-CODE	None

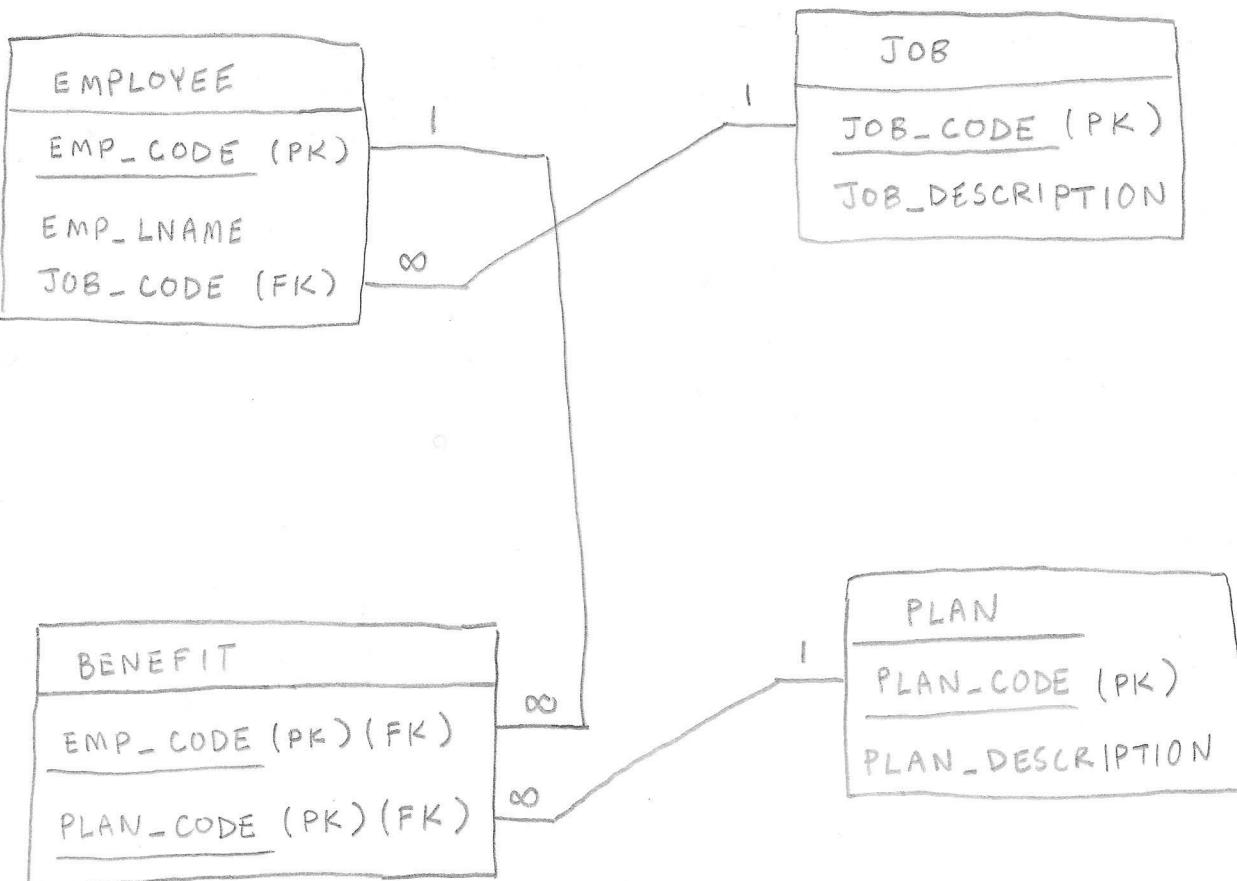
- b) Do the tables exhibit **entity** and **referential** integrity? Answer yes or no and then explain your answer. [8 Points]

TABLE	ENTITY INTEGRITY	REFERENTIAL INTEGRITY	EXPLANATION
EMPLOYEE	yes	yes	<ul style="list-style-type: none"> - Every value of EMP-CODE is unique and it contains no nulls. - Every value of JOB-CODE references an existing primary key value in the JOB table.
BENEFIT	yes	yes	<ul style="list-style-type: none"> - Every value of (EMP-CODE, PLAN-CODE) is unique and it contains no nulls. - Every value of EMP-CODE and PLAN-CODE reference existing primary key values in the EMPLOYEE and PLAN tables.
JOB	yes	N/A	<ul style="list-style-type: none"> - Every value of JOB-CODE is unique and it contains no nulls. - Referential integrity N/A because no foreign key.
PLAN	yes	N/A	<ul style="list-style-type: none"> - Every value of PLAN-CODE is unique and it contains no nulls. - Referential integrity N/A because no foreign key.

Name:- _____

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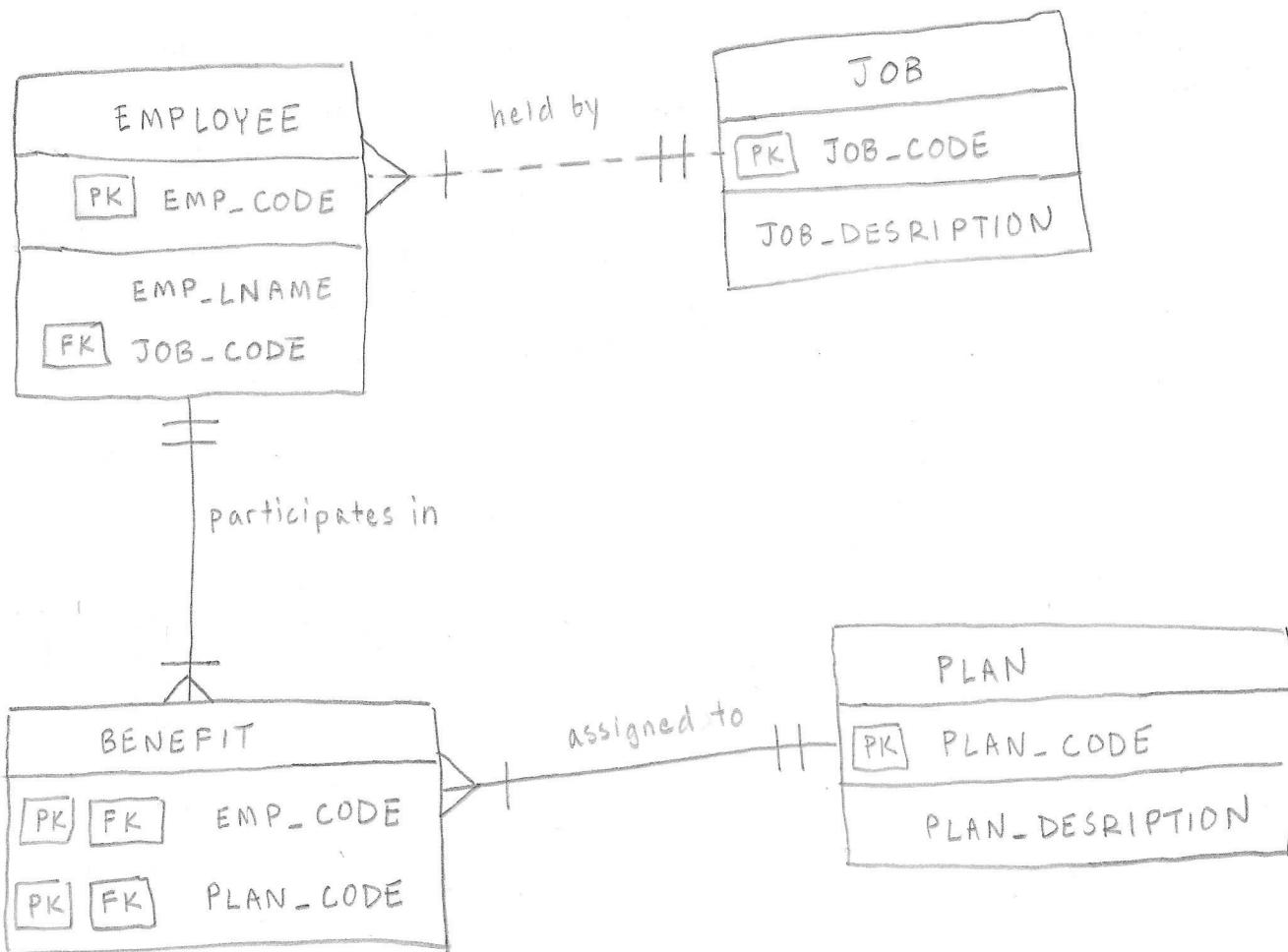
- c) Create the relational diagram to show the relationships among EMPLOYEE, BENEFIT, JOB, and PLAN.
[10 Points]



Name:- _____

Id#:- _____

- d) Create the ERD to show the relationships among EMPLOYEE, BENEFIT, JOB, and PLAN. [10 Points]



Note the following:

- The relationship between **JOB** and **EMPLOYEE** is a weak relationship.
- The relationships between **EMPLOYEE** and **BENEFIT**, and **PLAN** and **BENEFIT**, are strong relationships.
- All relationships are defined as mandatory.

Name:- _____

Id#:- _____

Question 2:-

Use the tables:- EMPLOYEE, STORE and REGION to answer questions below:-
 Use the tables:- EMPLOYEE, STORE and REGION to answer questions below:-

Table name: EMPLOYEE PK

Database name: Ch03_StoreCo FK

EMP_CODE	EMP_TITLE	EMP_LNAME	EMP_FNAME	EMP_INITIAL	EMP_DOB	STORE_CODE
1	Mr.	Williamson	John	W	21-May-64	3
2	Ms.	Ratula	Nancy		09-Feb-69	2
3	Ms.	Greenboro	Lottie	R	02-Oct-61	4
4	Mrs.	Rumpersstro	Jennie	S	01-Jun-71	5
5	Mr.	Smith	Robert	L	23-Nov-59	3
6	Mr.	Renselaer	Cary	A	25-Dec-65	1
7	Mr.	Ogallo	Roberto	S	31-Jul-62	3
8	Ms.	Johnsson	Elizabeth	I	10-Sep-68	1
9	Mr.	Eindsmar	Jack	W	19-Apr-55	2
10	Mrs.	Jones	Rose	R	06-Mar-66	4
11	Mr.	Broderick	Tom		21-Oct-72	3
12	Mr.	Washington	Alan	Y	08-Sep-74	2
13	Mr.	Smith	Peter	N	25-Aug-64	3
14	Ms.	Smith	Sherry	H	25-May-66	4
15	Mr.	Olenko	Howard	U	24-May-64	5
16	Mr.	Archialo	Barry	V	03-Sep-60	5
17	Ms.	Grimaldo	Jeanine	K	12-Nov-70	4
18	Mr.	Rosenberg	Andrew	D	24-Jan-71	4
19	Mr.	Rosten	Peter	F	03-Oct-68	1
20	Mr.	McKee	Robert	S	06-Mar-70	1
21	Ms.	Baumann	Jennifer	A	11-Dec-74	3

Table name: STORE PK FK

STORE_CODE	STORE_NAME	STORE_YTD_SALES	REGION_CODE	EMP_CODE
1	Access Junction	1003455.76	2	8
2	Database Corner	1421987.39	2	12
3	Tuple Charge	986783.22	1	7
4	Attribute Alley	944568.56	2	3
5	Primary Key Point	2930098.45	1	15

Table name: REGION PK

REGION_CODE	REGION_DESCRPT
1	East
2	West

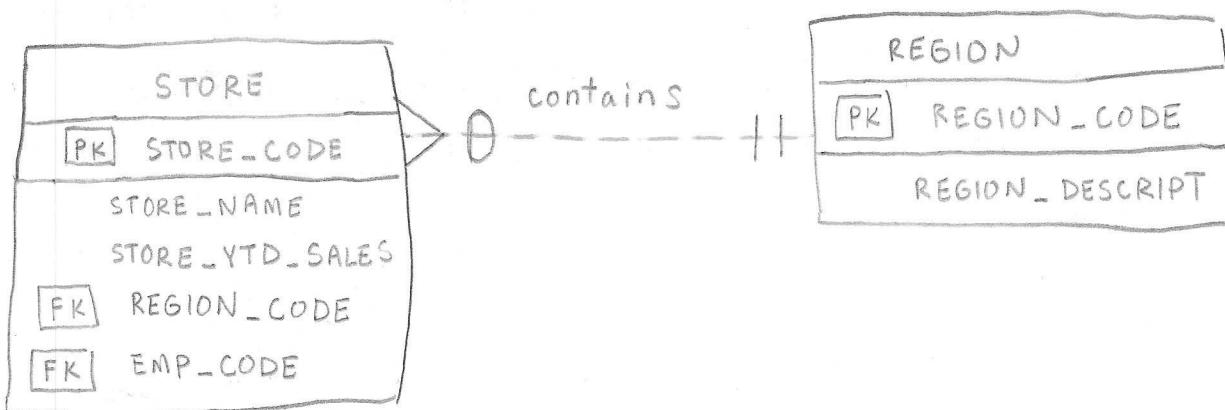
- a) Describe the type(s) of relationship(s) between STORE and REGION. [4 Points]

Each REGION can contain many stores because REGION_CODE values occur more than once in the STORE table. But each STORE is located in only one REGION. Therefore, the relationship between STORE and REGION is M:1.

Name:- _____

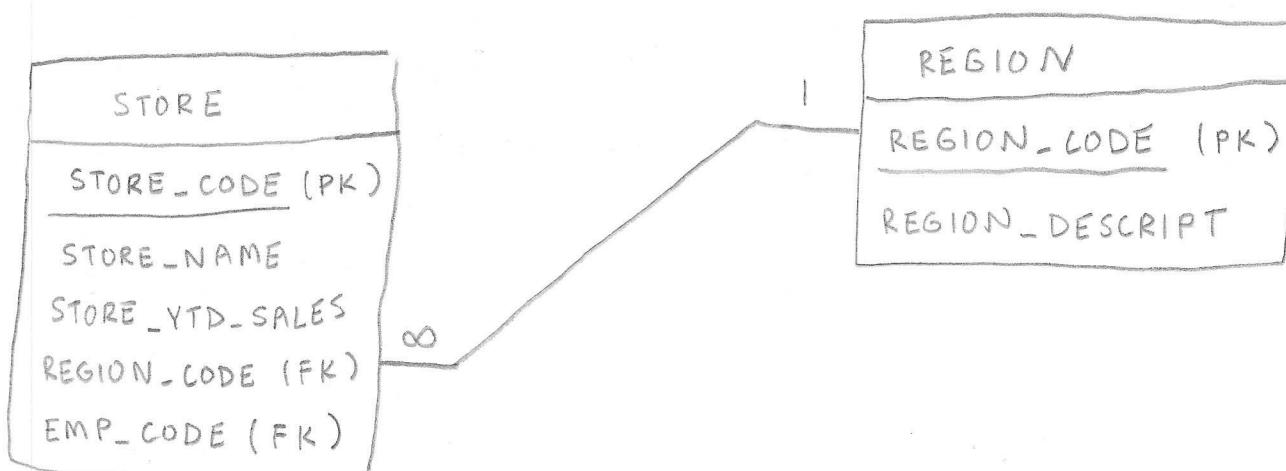
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- b) Create the ERD to show the relationship between STORE and REGION. [4 Points]



- Note the relationship between REGION and STORE is a weak relationship.

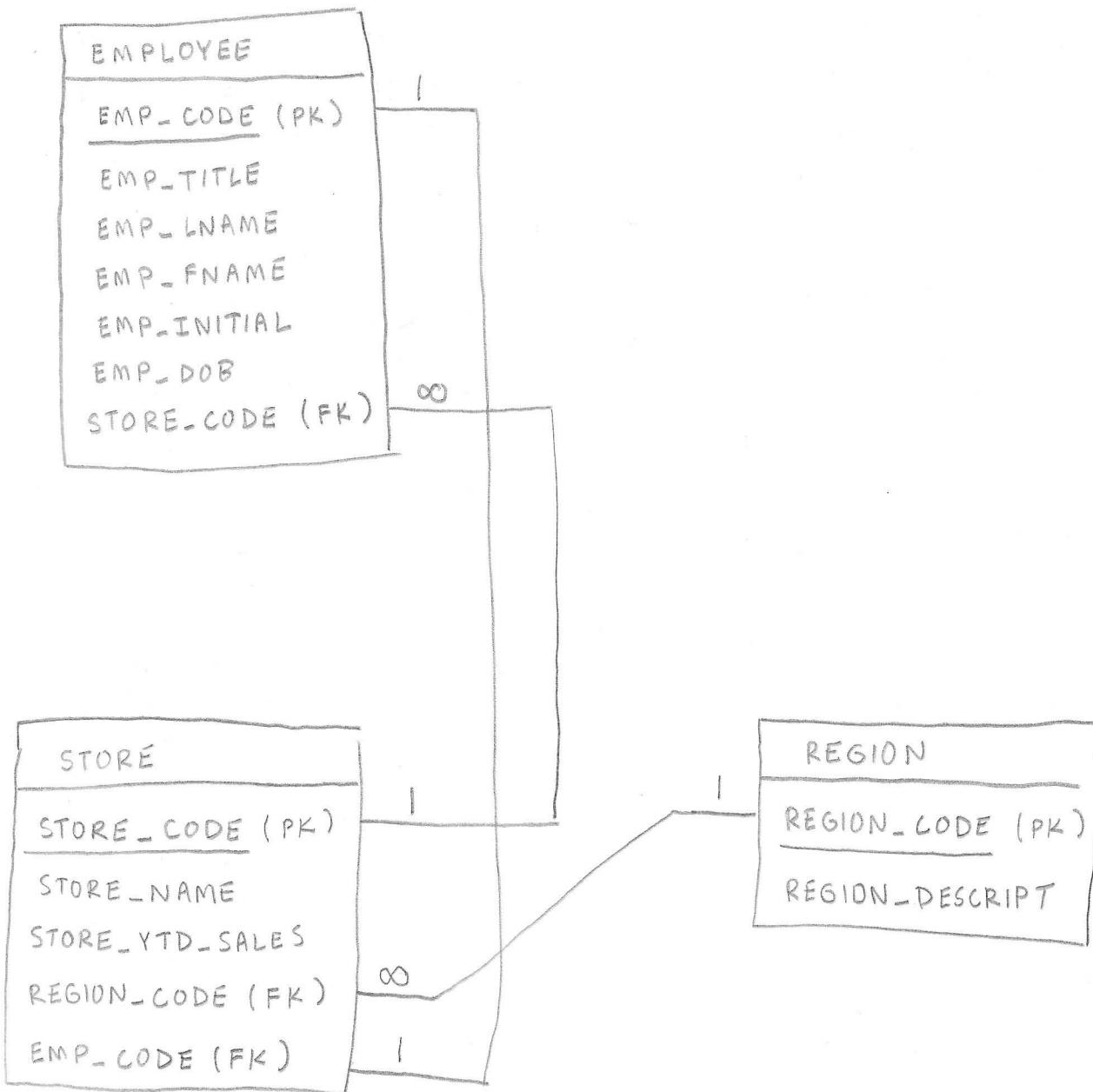
- c) Create the relational diagram to show the relationship between STORE and REGION. [4 Points]



Name:- _____

Id#:- _____

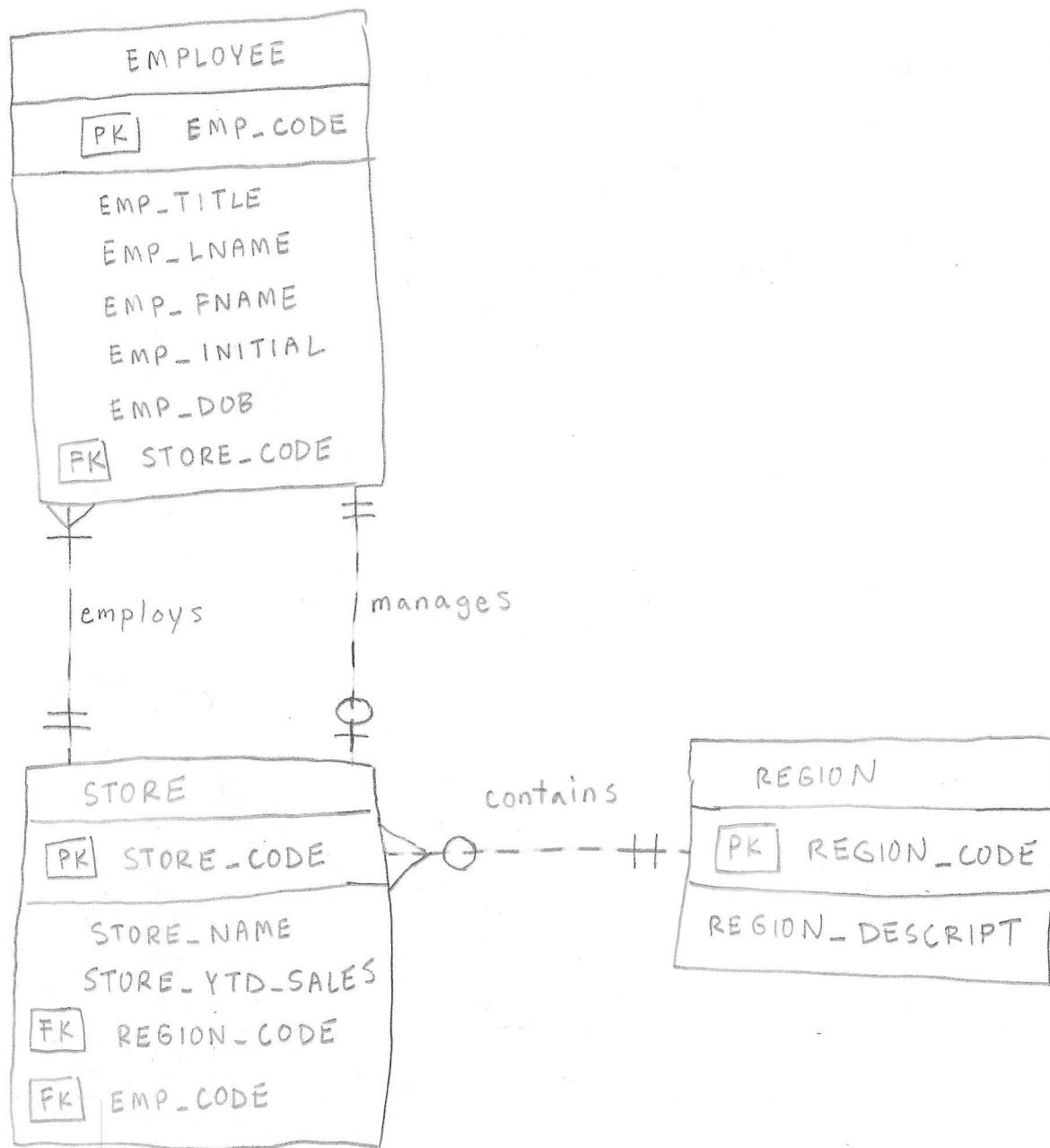
- d) Create the relational diagram to show the relationships among EMPLOYEE, STORE, and REGION.
 [5 Points]



Name:- _____

Id#:- _____

- e) Create the ERD to show the relationships among EMPLOYEE, STORE, and REGION.
[5 Points]



Note the Following:

- STORE has been defined as optional to REGION to provide the ability to add a new REGION before a STORE in that REGION has been opened. However, REGION is MANDATORY to STORE so a STORE must be assigned a REGION to be added.
- We define that a STORE must have at least one EMPLOYEE.
- Each STORE must be managed by one EMPLOYEE^(mandatory) and each EMPLOYEE manages zero or one STORE's (optional).
- Note that all relationships are weak relationships.

Name:- _____

[16 Points]

Question 3:-

ABC City League needs a database system to help track children that sign up to play soccer. Data needs to be kept on each team and the children that will be playing on each team and their parents. Also, data needs to be kept on the coaches for each team. Draw the ERD conceptual model described below. Be sure to denote the primary and foreign keys for each entity.

Entities required: Team, Player, Coach, and Parent.

Attributes required:

Team: Team ID number, Team name, and Team colors.

Player: Player ID number, Player first name, Player last name, and Player age.

Coach: Coach ID number, Coach first name, Coach last name, and Coach home phone number.

Parent: Parent ID number, Parent last name, Parent first name, Home phone number, and Home

Address (Street, City, State, and ZIP Code).

The following relationships must be defined:

- ✓ • Team is related to Player.
- ✓ • Team is related to Coach.
- ✓ • Player is related to Parent.

Connectivities and participations are defined as follows:

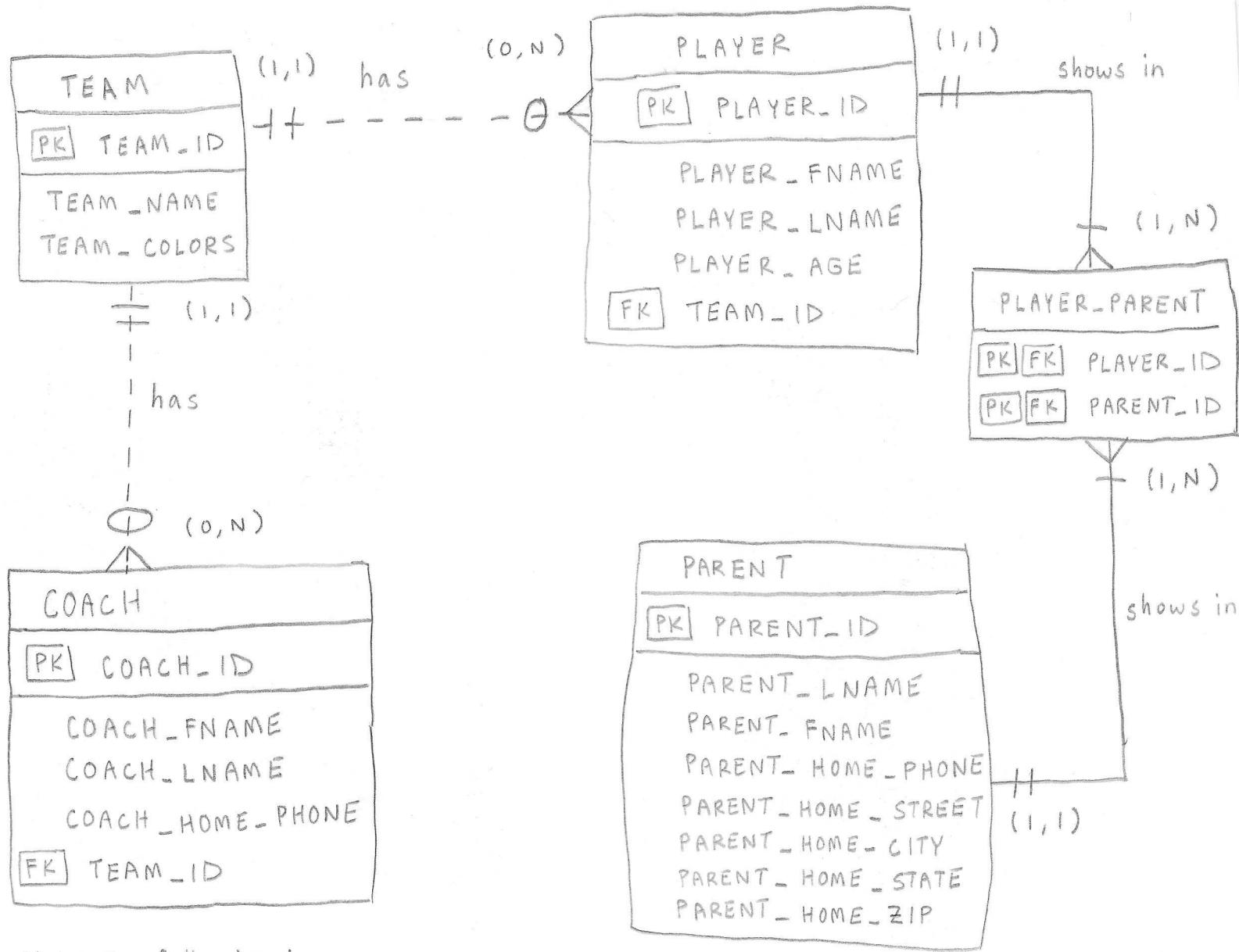
- ✓ • A Team may or may not have a Player.
- ✓ • A Player must have a Team.
- ✓ • A Team may have many Players.
- ✓ • A Player has only one Team.
- ✓ • A Team may or may not have a Coach.
- ✓ • A Coach must have a Team.
- ✓ • A Team may have many Coaches.
- ✓ • A Coach has only one Team.
- ✓ • A Player must have a Parent.
- ✓ • A Parent must have a Player.
- ✓ • A Player may have many Parents.
- ✓ • A Parent may have many Players.

Question 3 Note the following relationship details:

ENTITY	REL'SHIP	CONNECTIVITY	CARDINALITY	STRENGTH	ENTITY
✓ TEAM	has	0 : M	(0, N)	weak	PLAYER
✓ PLAYER	plays for	1 : 1	(1, 1)	weak	TEAM
✓ TEAM	has	0 : M	(0, N)	weak	COACH
✓ COACH	coaches	1 : 1	(1, 1)	weak	TEAM
PLAYER	belongs to	1 : M		weak	PARENT
PARENT	has	1 : M		weak	PLAYER
✓ PLAYER	shows in	1 : M	(1, N)	strong	PLAYER - PARENT
✓ PLAYER-PARENT	contains	1 : 1	(1, 1)	strong	PLAYER
✓ PARENT	shows in	1 : M	(1, N)	strong	PLAYER - PARENT
✓ PLAYER-PARENT	contains	1 : 1	(1, 1)	strong	PARENT

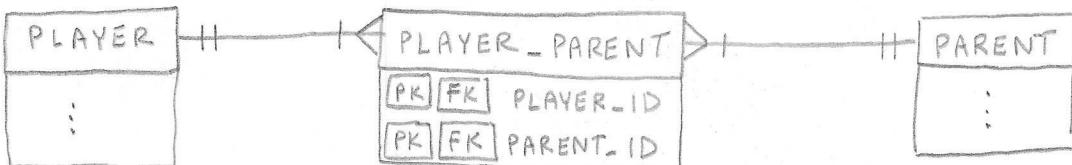
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Name:- _____



Note the following:

- The relationship between **PLAYER** and **PARENT** is M:N. While this is acceptable in this ERD conceptual model, it is not implementable in a relational database. To solve this problem, the M:N relationship can be broken up into two 1:M relationships using the composite entity **PLAYER-PARENT** shown below:



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Question 4:- Given the following business scenario, create a **Crow's Foot ERD using a specialization hierarchy.** [16 Points]

AON Sales Company keeps information on employees and the departments that they work in.

- For each department, the department name, internal mail box number, and office phone extension are kept.
- A department can have many assigned employees, and each employee is assigned to only one department.
- Employees can be salaried employees, hourly employees, or contract employees. All employees are assigned an employee number. This is kept along with the employee's name and address.
- For hourly employees, hourly wage and target weekly work hours are stored (e.g. the company may target 40 hours/week for some, 32 hours/week for others, and 20 hours/week for others).
- Some salaried employees are salespeople that can earn a commission in addition to their base salary. For all salaried employees, the yearly salary amount is recorded in the system.
- For salespeople, their commission percentage on sales and commission percentage on profit are stored in the system. For example, John is a salesperson with a base salary of \$50,000 per year plus 2-percent commission on the sales price for all sales he makes plus another 5 percent of the profit on each of those sales.
- For contract employees, the beginning date and end dates of their contract are stored along with the billing rate for their hours.

For full points, be sure to indicate:-

- higher-level entity super types (parent entities) and lower-level entity subtypes (child entities)
- any shared or inherited attributes and relationships
- disjoint/overlapping constraints
- partial/complete constraints
- any subtype discriminators

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