# CS 317 – Data Management and Information Systems
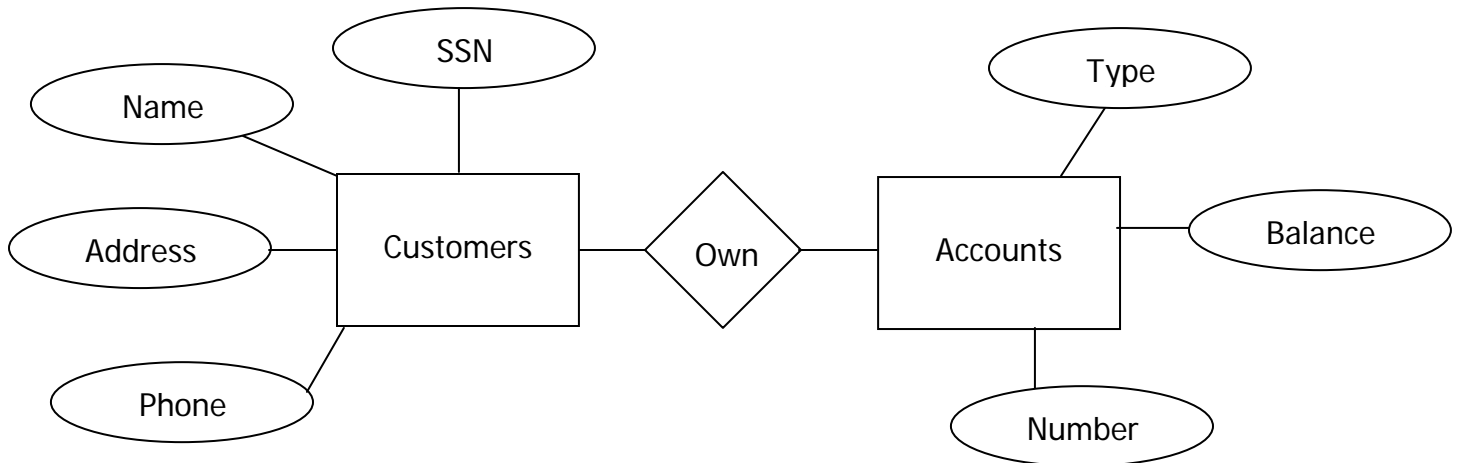Professor Yan Chen
Homework 1 Solutions
Grader: Jin Hu

Key:

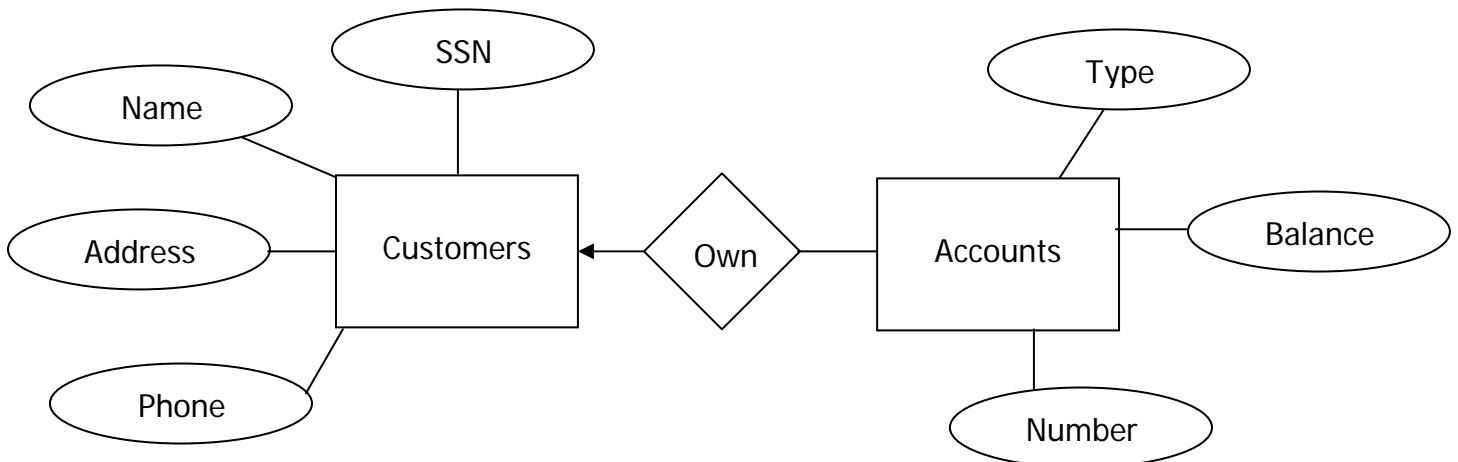| | |
|---|---|
| ——————— | Many-Many Relationship |
| ————————▶ | Many-One Relationship |
| ◀———————— | One-Many Relationship |
| ◀———————▶ | One-One Relationship |
| ————————● | Referential Integrity |
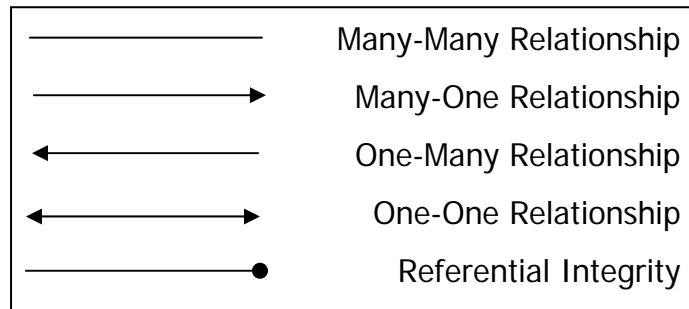
Note:     Below is just ONE right answer. There are many possible correct responses. If your response is different, that does not necessarily mean that your solution is incorrect.
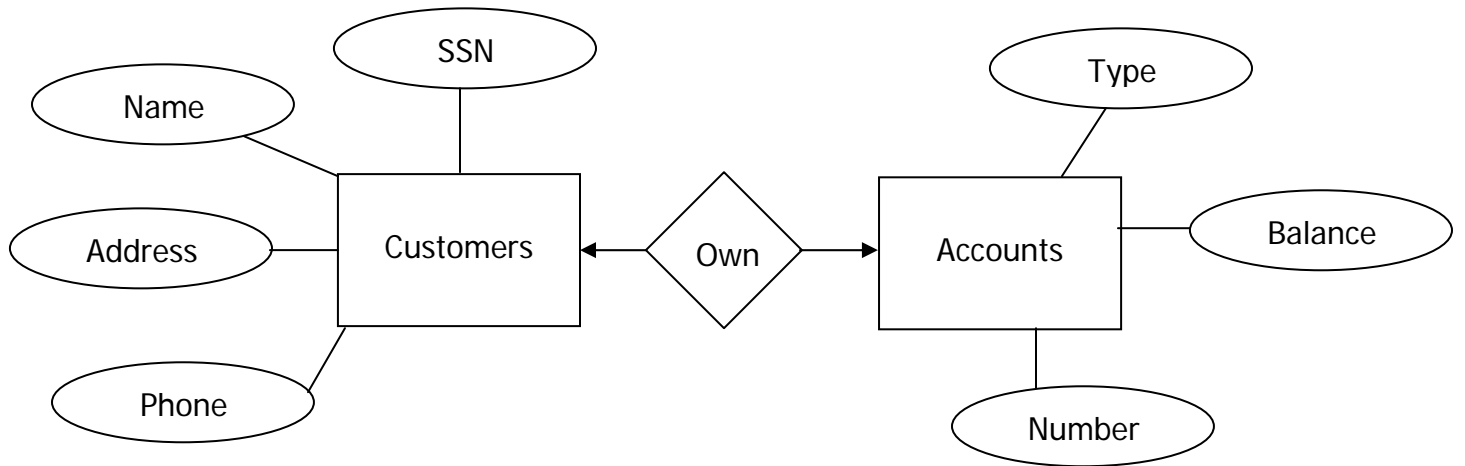
**Problem 2.1.1**     (7 points)
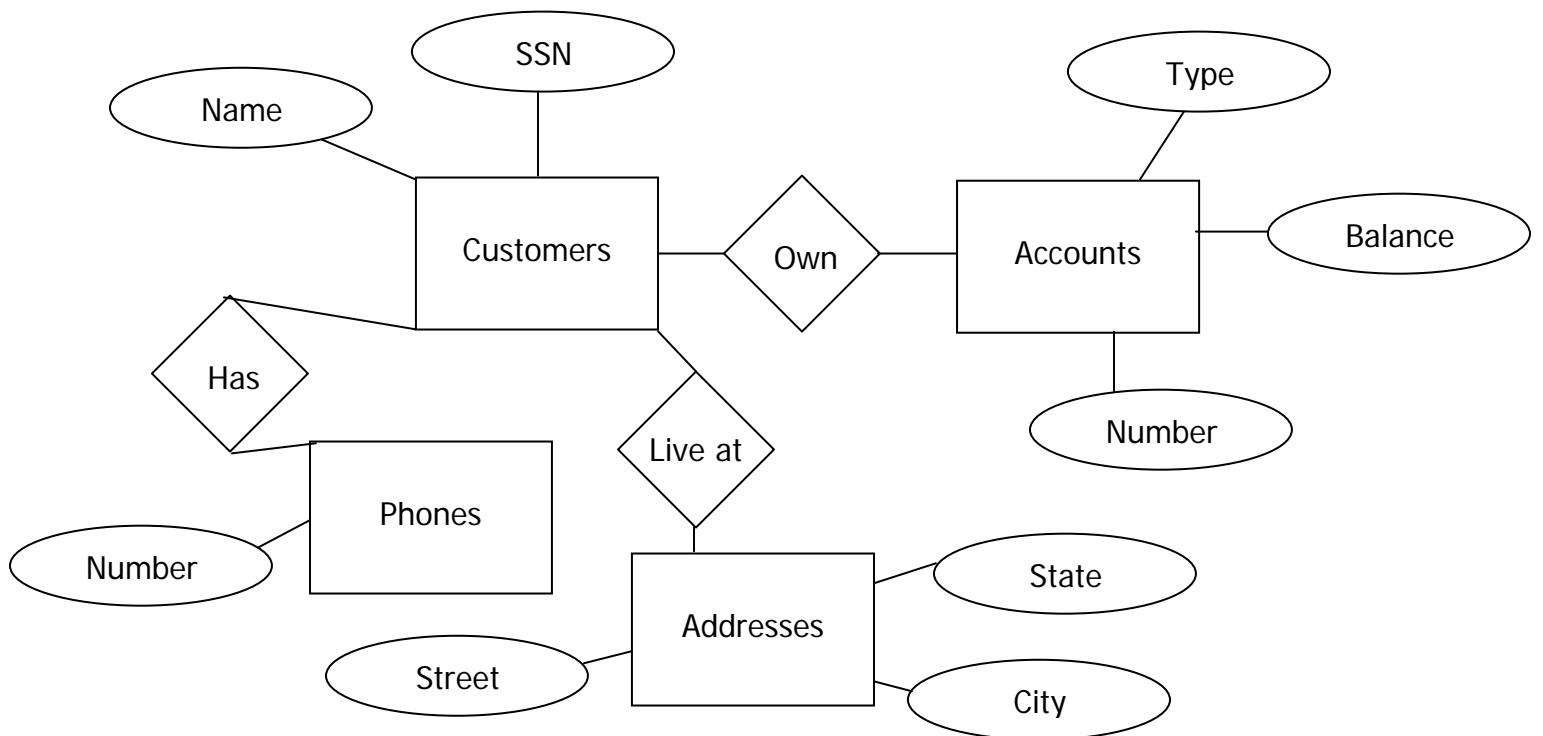


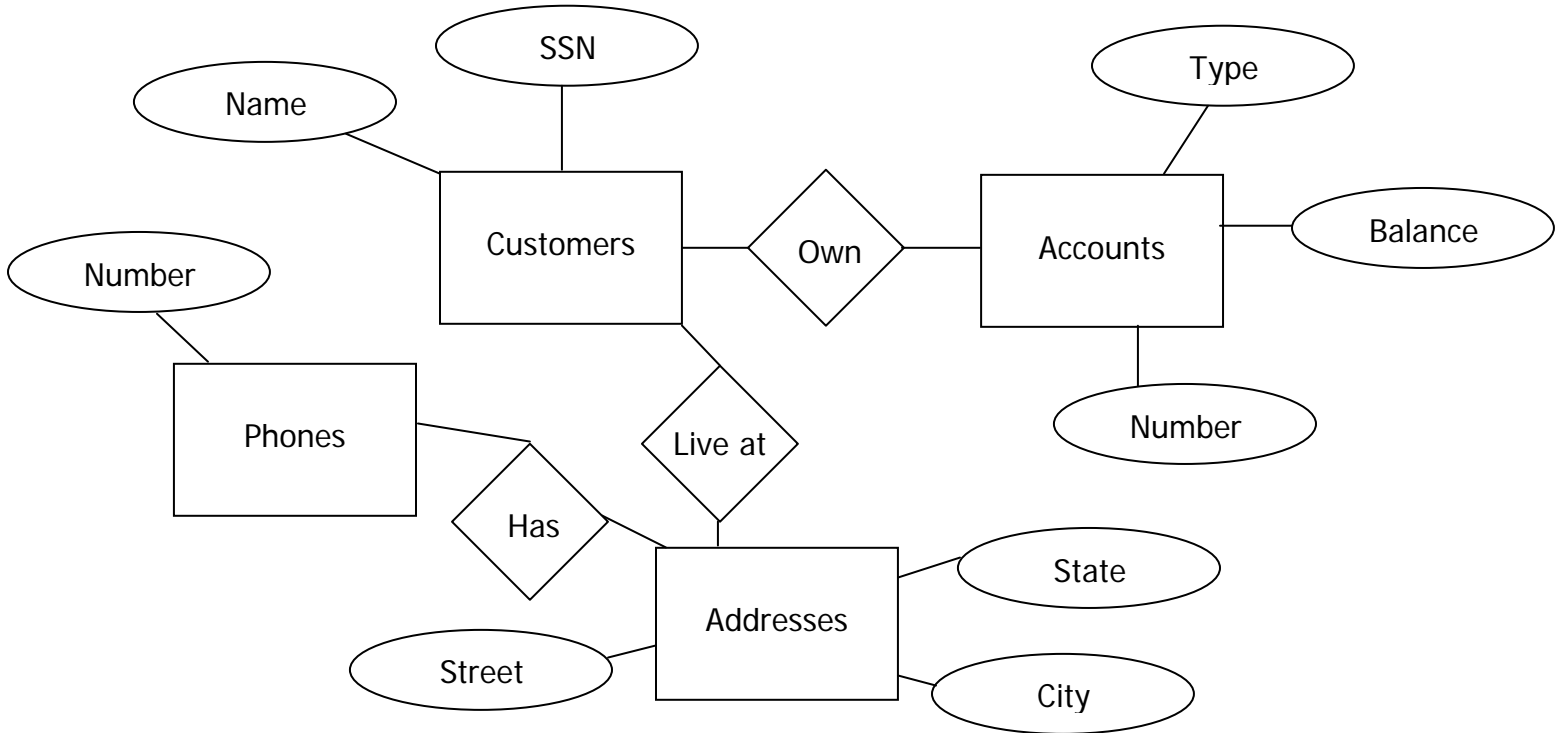**Problem 2.1.2**     (16 points)

**Part a)**     (3 points)

SSN

Name

Type

Address          Customers     ◄  Own  ►     Accounts          Balance

Phone

Number

SSN

Name

Type

Customers     Own     Accounts          Balance

Has

Number

Phones

Live at

Number

Street     Addresses          State

City

**Part d)**    (5 points)



**Problem 2.1.3**    (10 points)
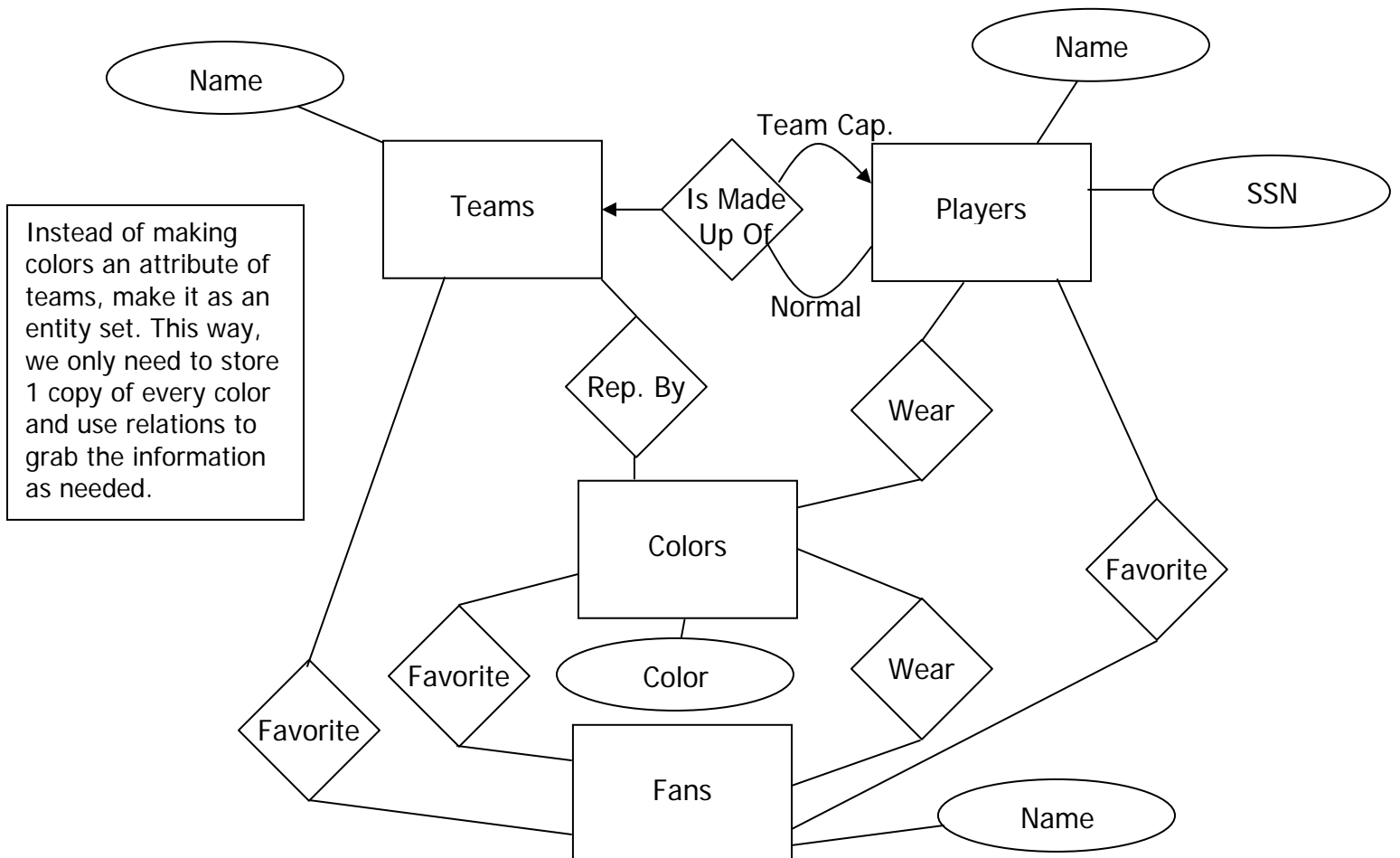
Instead of making colors an attribute of teams, make it as an entity set. This way, we only need to store 1 copy of every color and use relations to grab the information as needed.
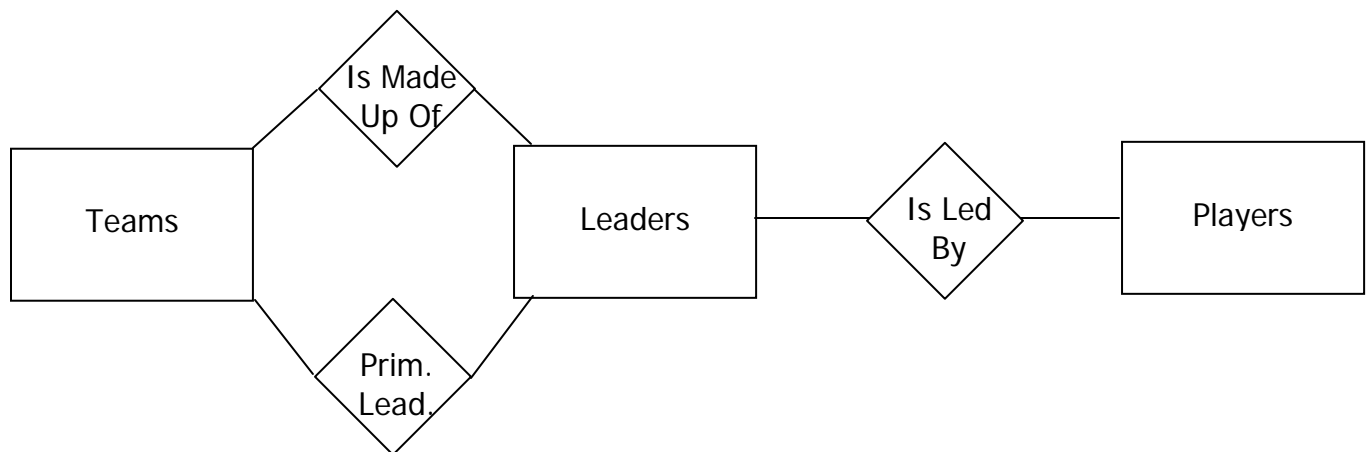
(15 points)

(5 points)

Only relevant part shown (Involves only Teams, Players, and their relations):
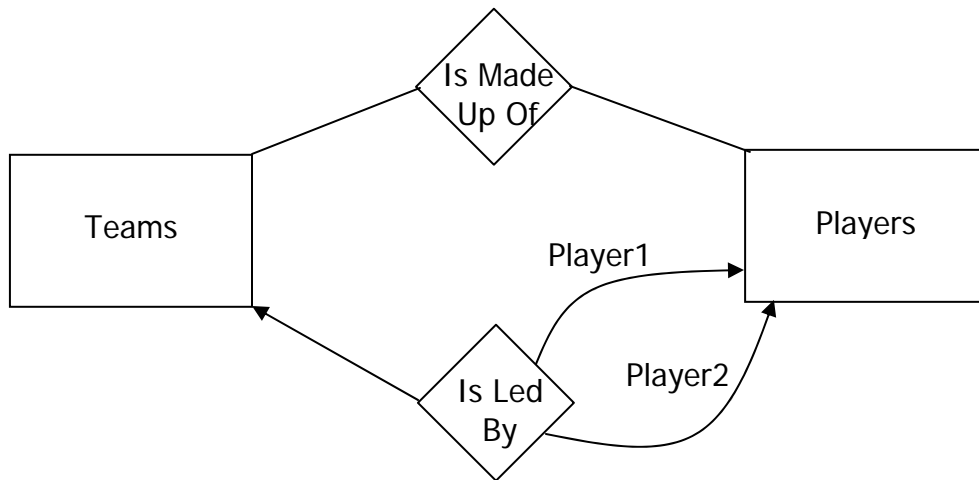


(5 points)

Only relevant part shown (Involves only Teams, Players, and their relations):



(5 points)

The relationships end up being the same. When the tertiary relation was split, a new entity set was formed. This is just redundant information, as leaders clearly overlap with Players. Nevertheless, both models convey the same information.
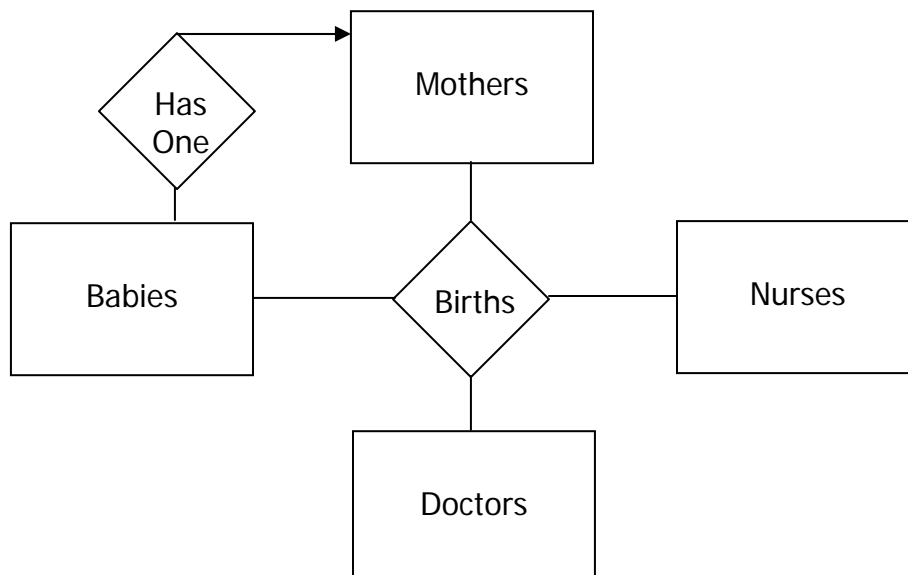
## Problem 2.1.6 (10 points)
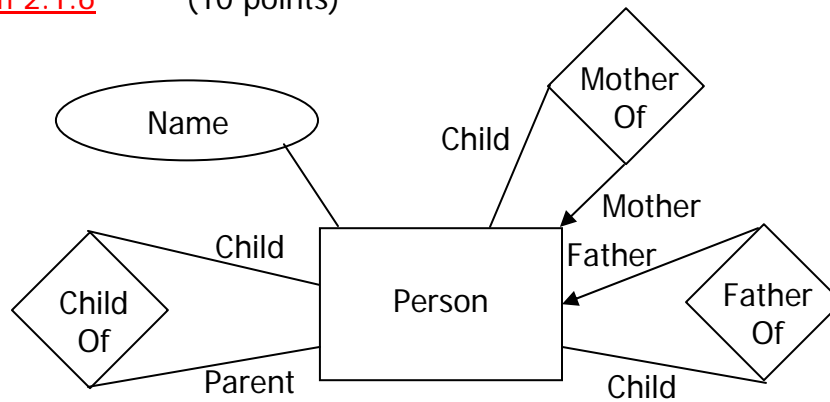


## Problem 2.2.1 (8 points)

The following are just a few examples – your answer may have additional responses as well.

1) *Violation:* Redundancy
   *Reason:* Addresses is storing address as an attribute but AcctSets stores the same address.
   *Modification:* Make address as an attribute to Customers.

2) *Violation:* Simplicity
   *Reason:* AcctSets serves no purpose (or it serves the same purpose has Addresses).
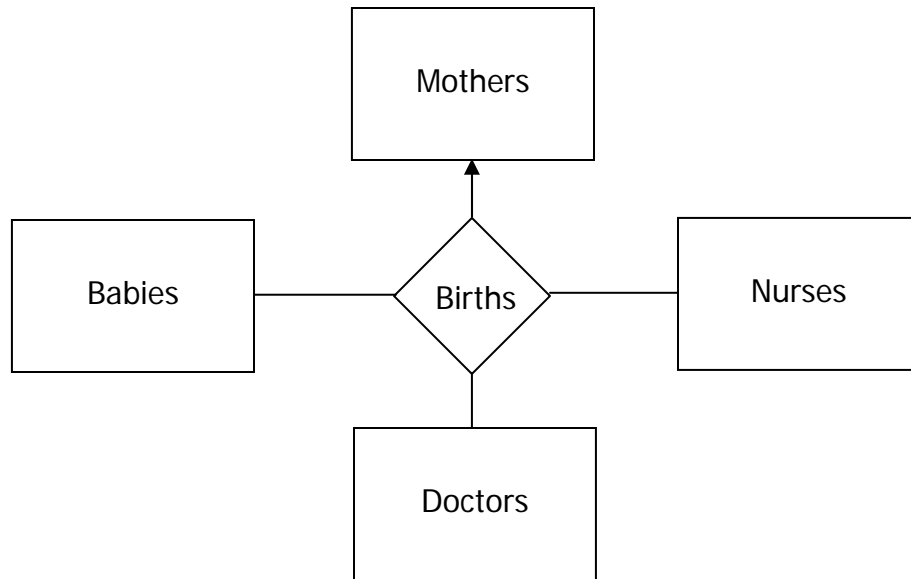   *Modification:* Delete AcctSets and directly connect Accounts to Customers with the "Member of" relation.

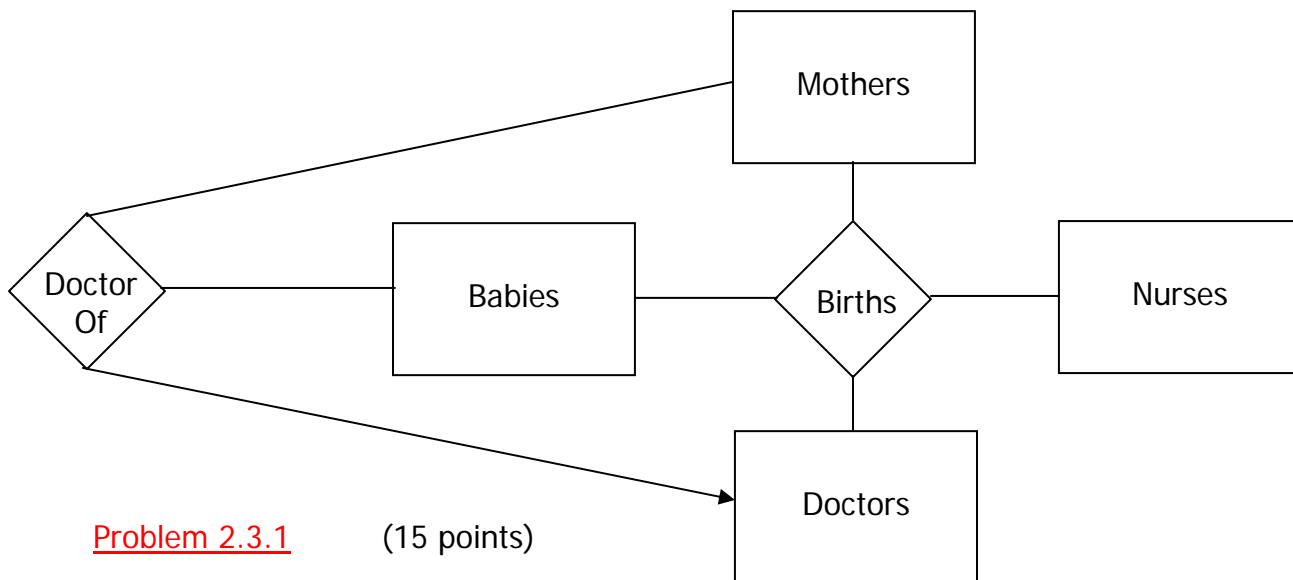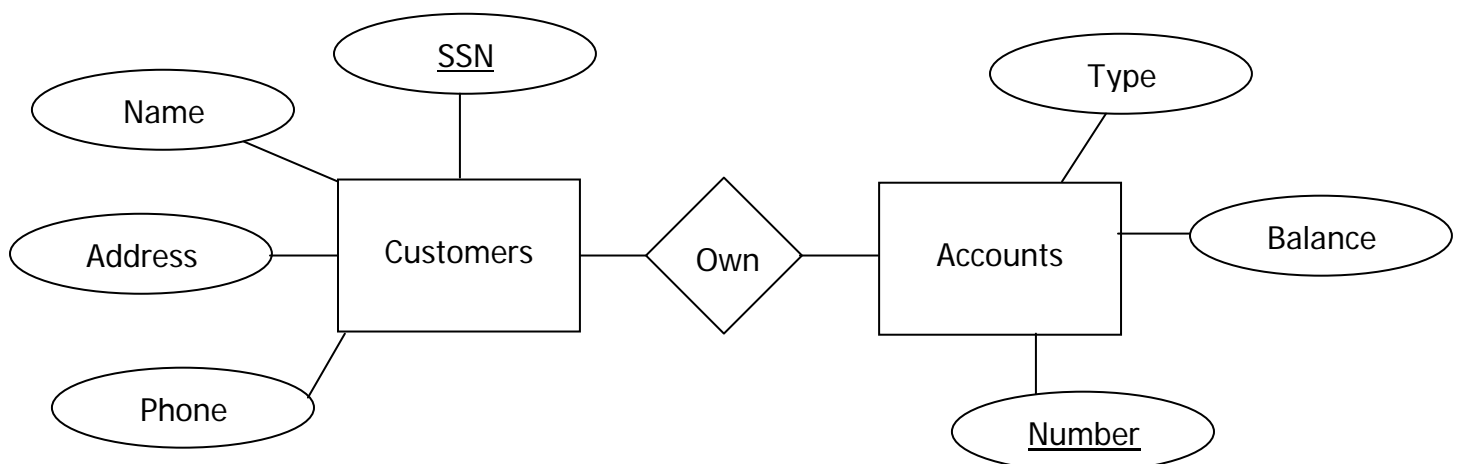## Problem 2.2.5 (15 points)

## Part a) (5 points)

(5 points)

Mothers

Babies — Births — Nurses

Doctors

Part c)  (5 points)

Mothers

Doctor Of — Babies — Births — Nurses

Doctors

Problem 2.3.1  (15 points)

Part a)  (5 points)

SSN

Name

Address    Customers — Own — Accounts
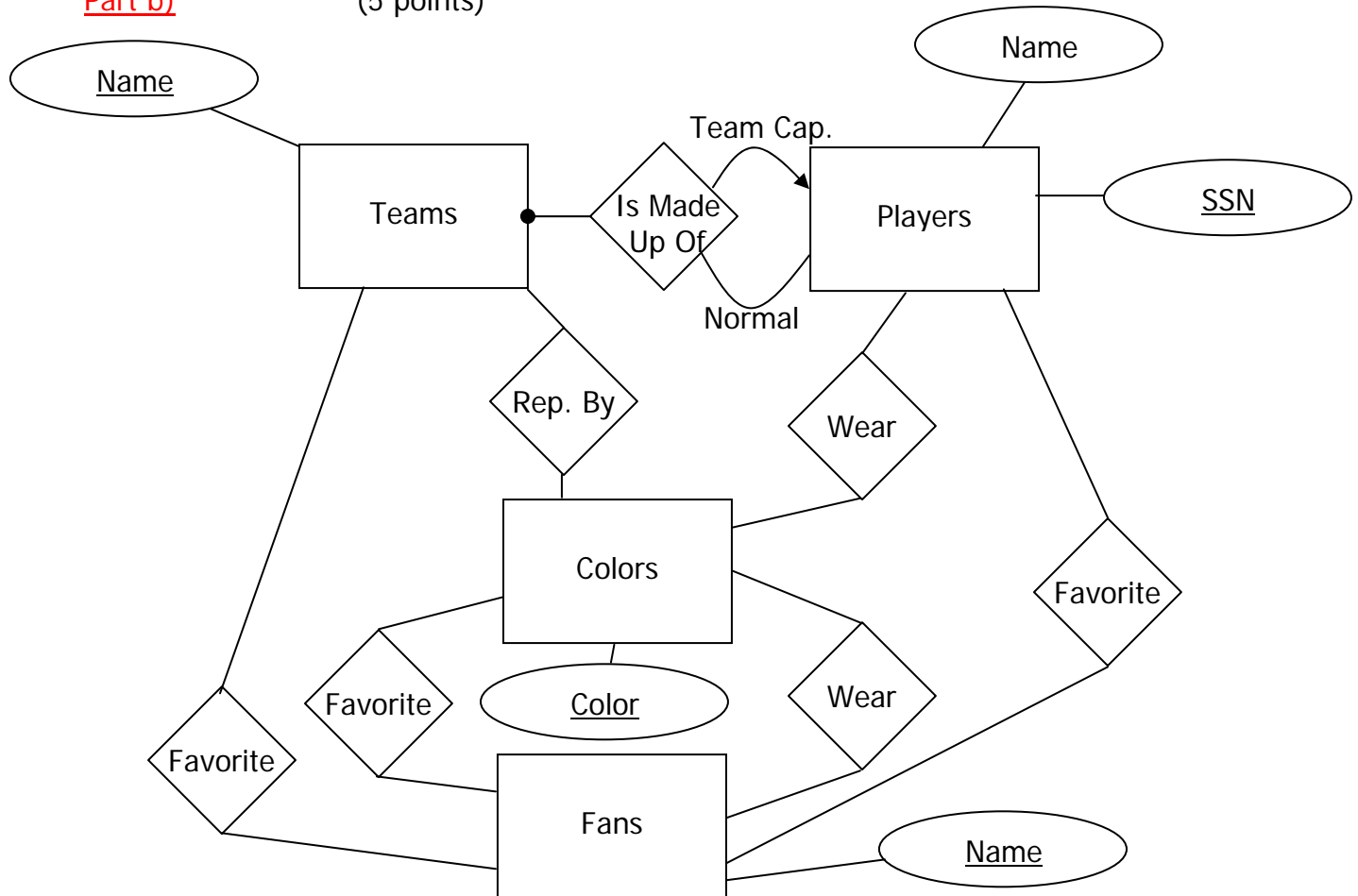
Phone

Type

Balance

Number

- Customers:      SSN
- Accounts:       Number

Referential Integrity Constraints (shown with rounded arrows)
- None
- You can have some so long as you state your assumption (i.e. Customer must exist for an account to be valid)

Part b)               (5 points)
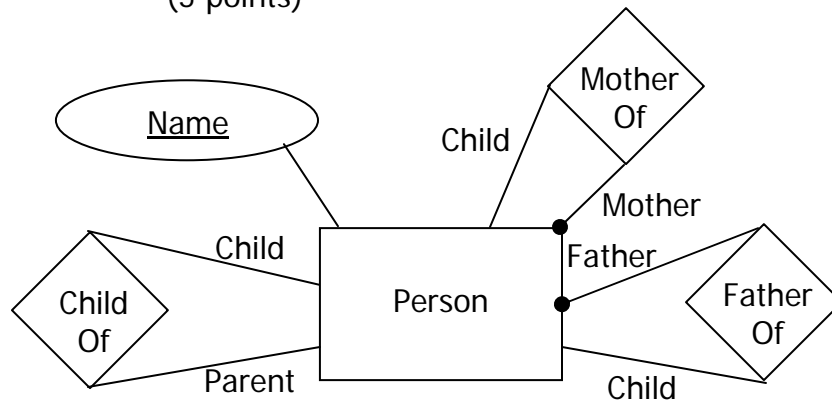


Keys (shown in underlines)
- Colors:   Color
- Fans:     Name (or SSN, if you have)
- Teams:    Name
- Players:  Name (or SSN)

Referential Integrity Constraints (shown with Rounded Arrows)
- Players must exist for a team to be valid
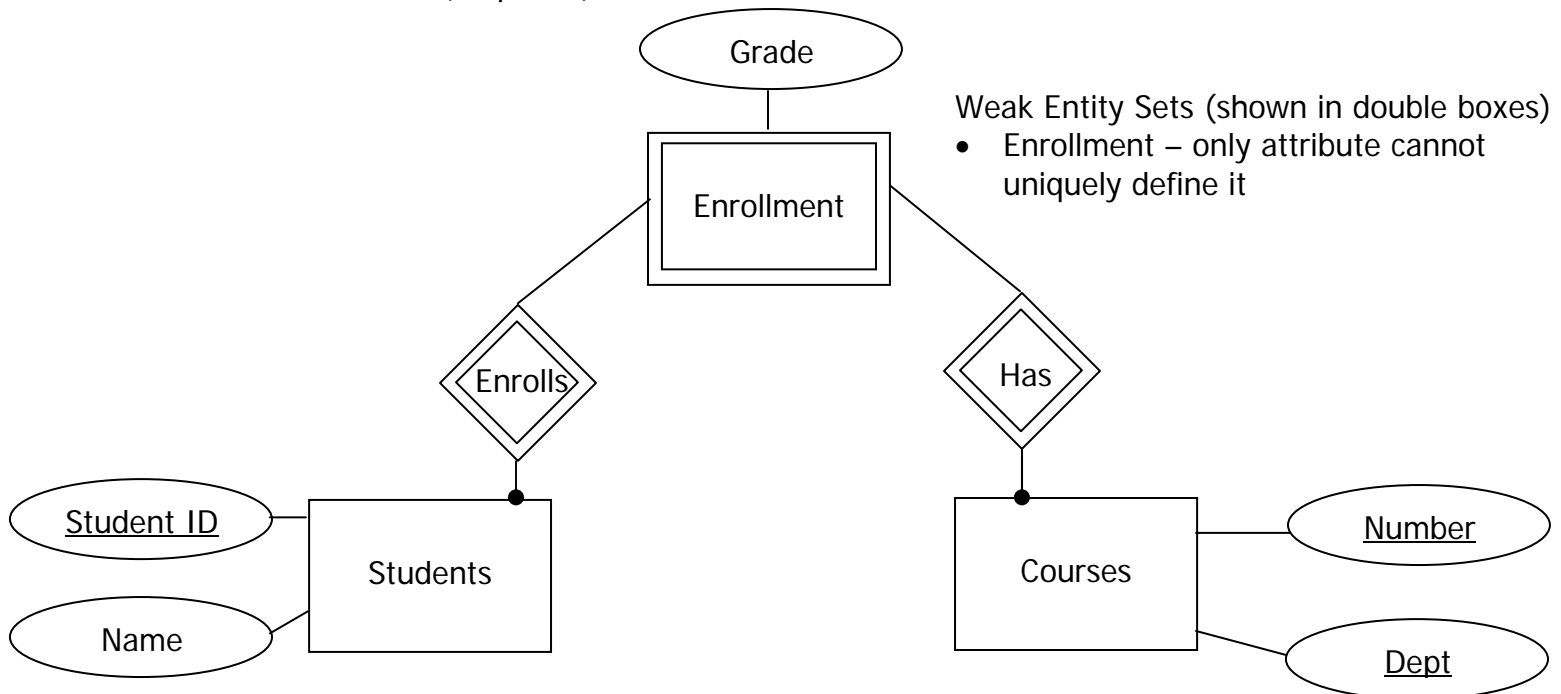
Keys (shown in underlines)
- Person:    Name

Referential Integrity Constraints (shown with rounded arrows)
- Mother must exist for a child
- Father must exist for a child

Problem 2.4.1          (10 points)



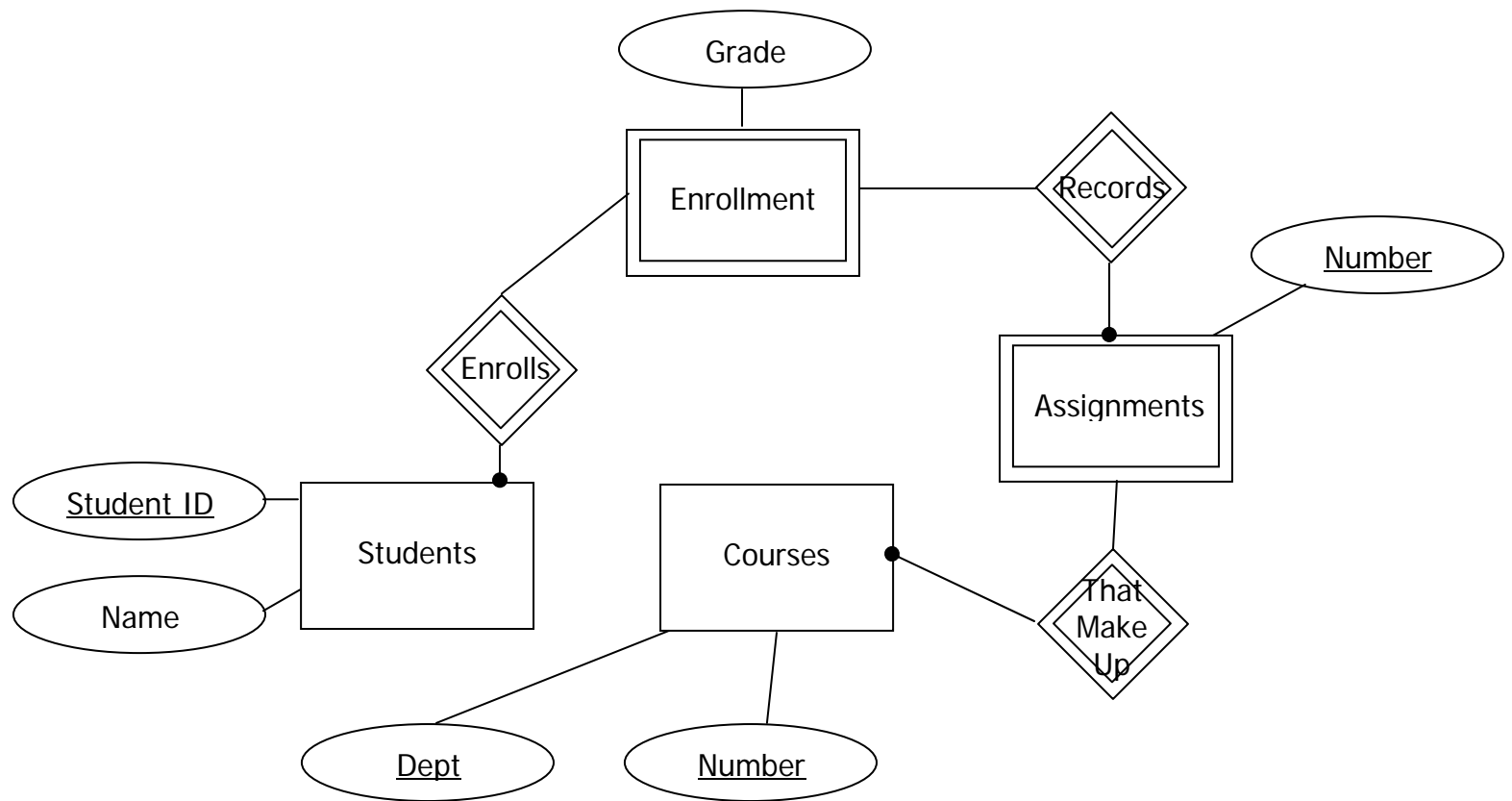Weak Entity Sets (shown in double boxes)
- Enrollment – only attribute cannot uniquely define it

Keys (shown in underlines)
- Courses:          Number and Dept.
- Students:         Student ID
- Enrollment:      Student ID, Dept., and Course Number
    - **Grade is NOT part of the key**

**Keys** (shown in underlines)
- Courses:　　　Dept. and Number
- Students:　　　Student ID
- Assignments:　Assignment Number, Dept., and Course Number
- Enrollment:　　Student ID, Assignment Number, Dept., and Course Number

**Weak Entity Sets** (shown in double boxes)
- Assignments
- Enrollment

Problem 2.4.4a　　　(5 points)