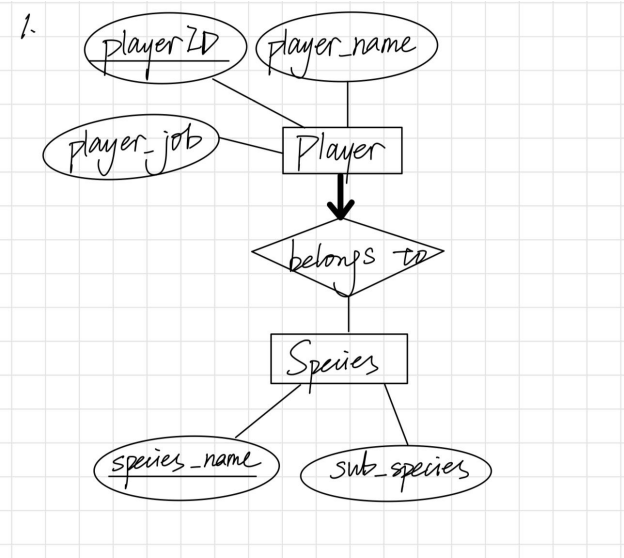
Assignment 4 Solution

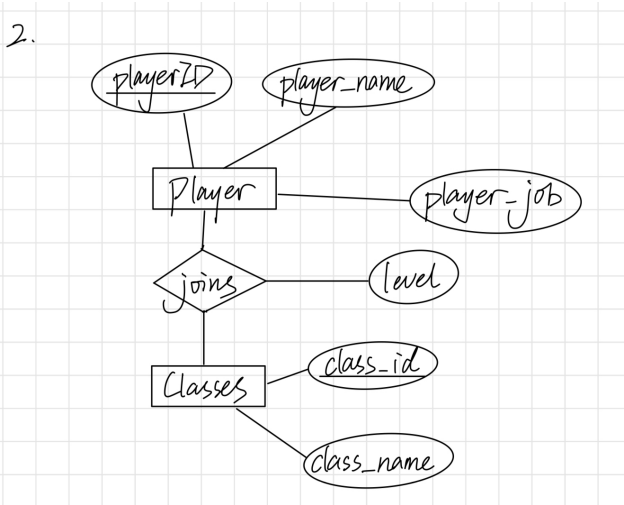
Name: Yanjun Chen, PSU ID: yfc5289

Part I: Problem 1

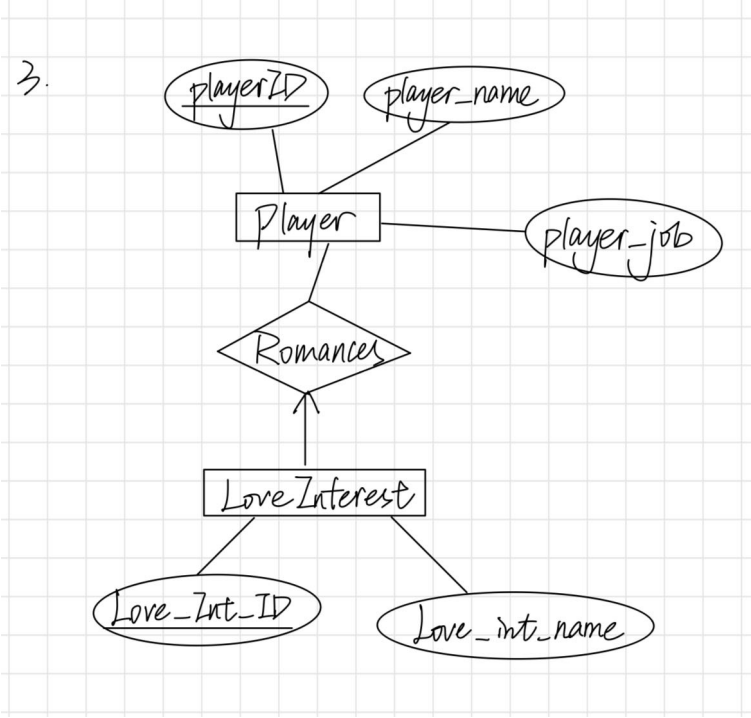
1.



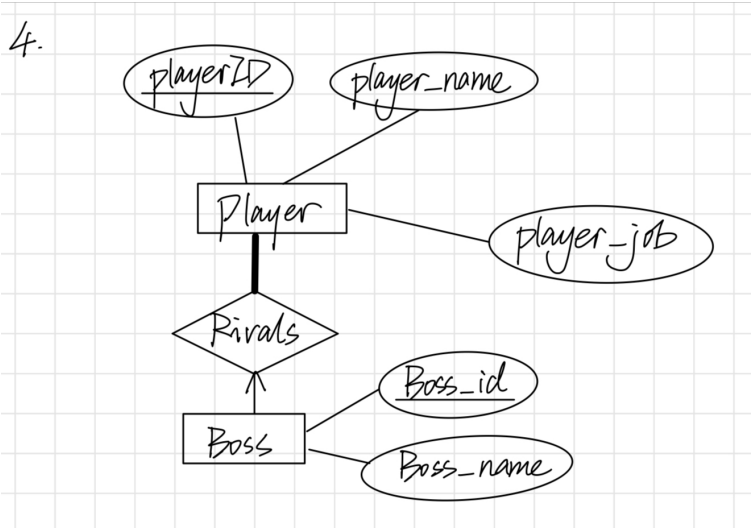
2.



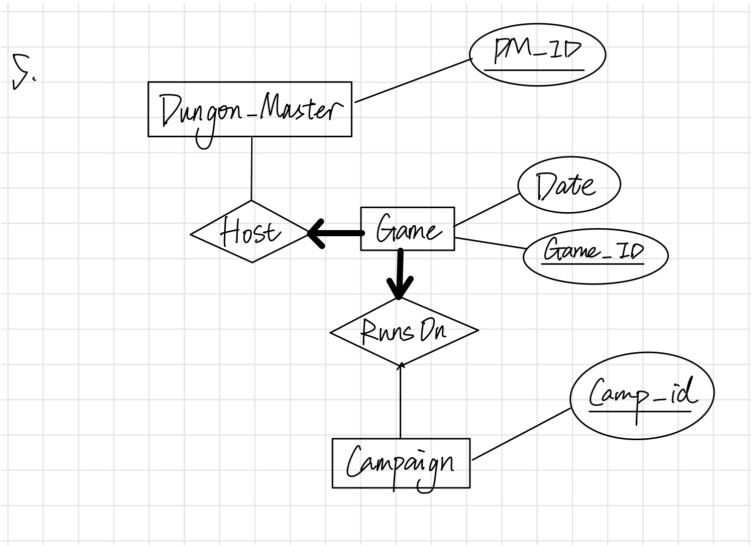
3.


3.
playerID
player_name
Player
player_job
Romances
LoveInterest
Love_Int_ID
Love_int_name

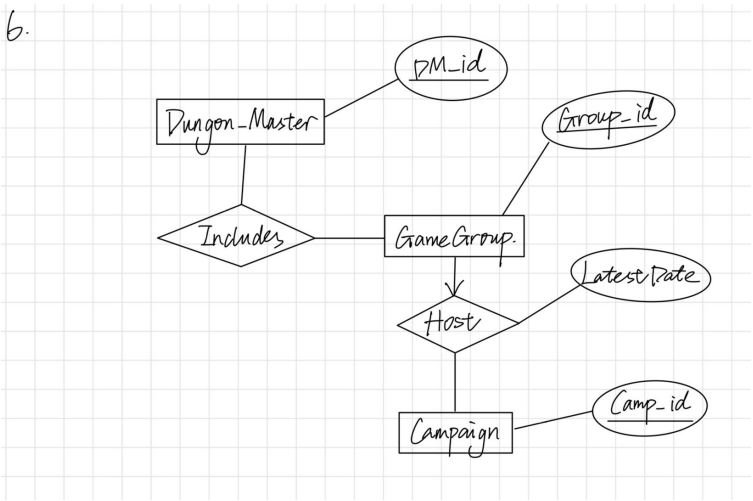
4.


4.
playerID
player_name
Player
player_job
Rivals
Boss_id
Boss
Boss_name

5.

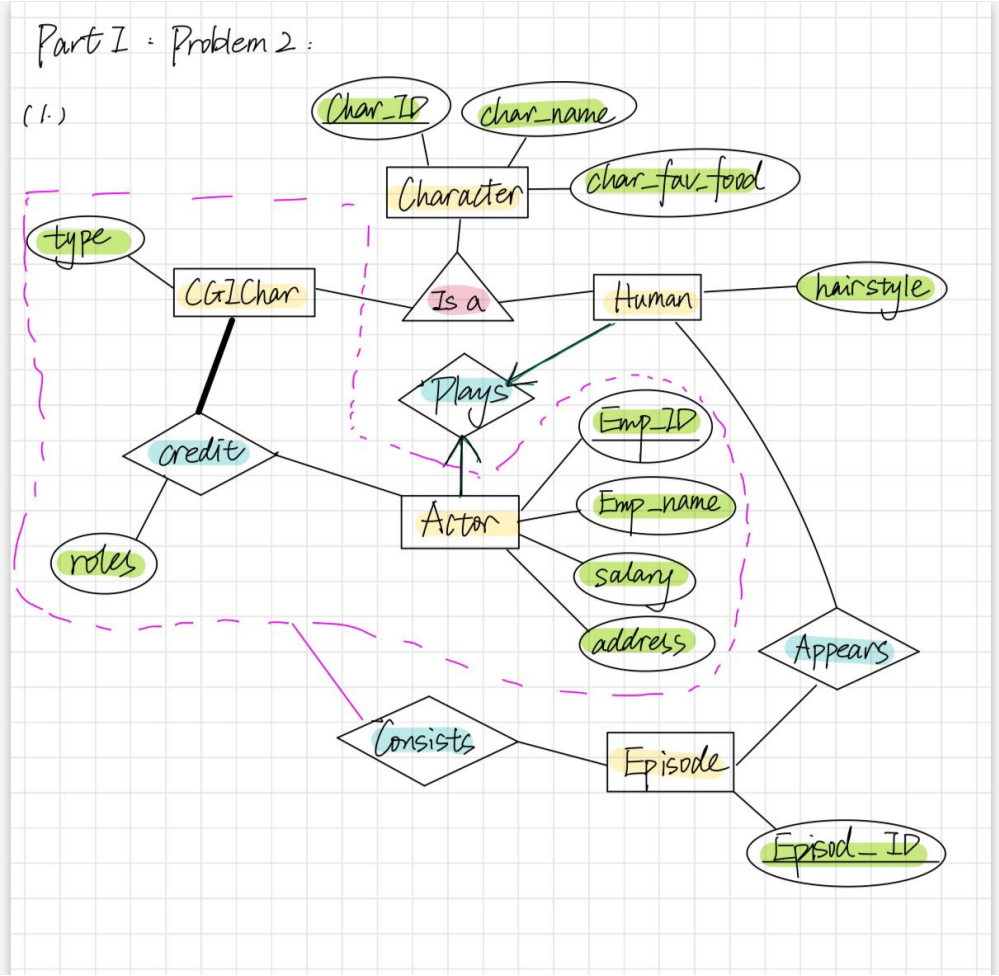

5.
DM_ID
Dungon_Master
Date
Host
Game
Game_ID
Runs On
Camp_id
Campaign

6.


6.
DM_id
Dungon_Master
Group_id
Includes
GameGroup
Latest Date
Host
Camp_id
Campaign

Part I: Problem 2

1.



2.

```
CREATE TABLE Character (
 Char_ID INT PRIMARY KEY,
 Char_name VARCHAR(100),
 Char_fav_food VARCHAR(100)
);

CREATE TABLE Human (
 Char_ID INT PRIMARY KEY,
 hairstyle VARCHAR(100),
 FOREIGN KEY (Char_ID) REFERENCES Character(Char_ID)
);

CREATE TABLE CGIChar (
 Char_ID INT PRIMARY KEY,
 type VARCHAR(100),
 FOREIGN KEY (Char_ID) REFERENCES Character(Char_ID)
);

CREATE TABLE Actor (
 Emp_ID INT PRIMARY KEY,
 Emp_name VARCHAR(100),
 samealary DECIMAL(10, 2),
 address VARCHAR(100)
);

CREATE TABLE Plays (
 Emp_ID INT,
 Char_ID INT,
 PRIMARY KEY (Emp_ID, Char_ID),
 FOREIGN KEY (Emp_ID) REFERENCES Actor(Emp_ID),
 FOREIGN KEY (Char_ID) REFERENCES Character(Char_ID)
);

CREATE TABLE Credit (
 CGIChar_ID INT,
 Emp_ID INT,
 Role VARCHAR(100),
 PRIMARY KEY (CGIChar_ID, Emp_ID),
 FOREIGN KEY (CGIChar_ID) REFERENCES CGIChar(Char_ID),
 FOREIGN KEY (Emp_ID) REFERENCES Actor(Emp_ID)
);

CREATE TABLE Episode (
 Episode_ID INT PRIMARY KEY
);
```

```
CREATE TABLE Consists (
 Episode_ID INT,
 CGIChar_ID INT,
 Emp_ID INT,
 PRIMARY KEY (Episode_ID, CGIChar_ID, Emp_ID),
 FOREIGN KEY (Episode_ID) REFERENCES Episode(Episode_ID),
 FOREIGN KEY (CGIChar_ID) REFERENCES CGIChar(Char_ID),
 FOREIGN KEY (Emp_ID) REFERENCES Actor(Emp_ID)
);

CREATE TABLE Appears (
 Episode_ID INT,
 HumanChar_ID INT,
 PRIMARY KEY (Episode_ID, HumanChar_ID),
 FOREIGN KEY (HumanChar_ID) REFERENCES Human(Char_ID),
 FOREIGN KEY (Episode_ID) REFERENCES Episode(Episode_ID)
);
```

Part II: Problem 1

1.

(a)
For row number 1, column A, we have A = 1 $\rightarrow$ C = 3;
For row number 4, column A, we have A = 1 $\rightarrow$ C = 4;
As $3 \neq 4$**,** $A \rightarrow C$ **does not hold.**

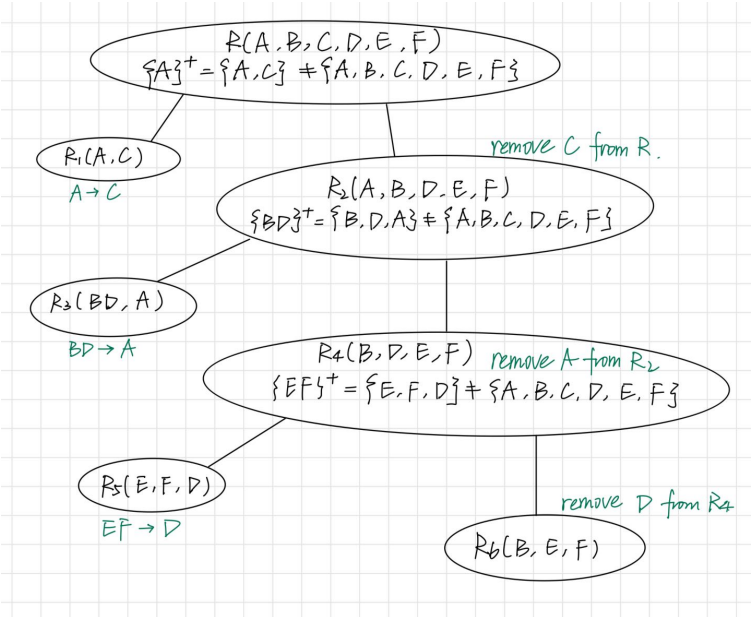
(b)
$CD \rightarrow A$ **holds, as we cannot find the exact same CD pair in the table.**

(c)
For row number 1 in column A, B and D, we have $(1,2,4) \rightarrow 1$ **in column E;**
For row number 4 in column A, B and D, we have $(1,2,4) \rightarrow 2$ **in column E;**
As $1 \neq 2$**,** $ABD \rightarrow E$ **does not hold.**

2.

$A \rightarrow B$; $A \rightarrow D$; $A \rightarrow BD$;
$D \rightarrow A$; $D \rightarrow B$; $D \rightarrow AB$;
$E \rightarrow B$; $E \rightarrow C$; $E \rightarrow BC$;

Part II: Problem 2



Here is the step-by-step explaination:

Step 1: Original $R(A,B,C,D,E,F)$ and the first FD $A \to C$. We have $\{A\}^+ = \{A,C\} \neq \{A,B,C,D,E,F\}$. Then we can break down the orginal R and have $R_1(A,C)$ and $R_2(A,B,D,E,F)$, which removed the C as it was $A \to C$.
Step 2: From R_2, we have the second FD $BD \to C$. We will have $\{BD\}^+ = \{B,D,A\} \neq \{A,C,B,D,E,F\}$. Again, we can then break down the R_2 into $R_3(BD,A)$ and $R_4(B,D,E,F)$, which is what we left after removing A for the same reason as C.
Step 3: From R_4, we have the last FD $EF \to D$. We have $\{EF\}^+ = \{E,F,D\} \neq \{A,B,C,D,E,F\}$. Then we break down R_4 for $EF \to D$ and have $R_5(E,F,D)$ and $R_6(B,E,F)$, which is what we left after we remove D for the same reason as A and C.

Part II: Problem 3

1. For all sets of attributes are closed, we can have "all implies empty set" as following:
$A \to \emptyset$; $B \to \emptyset$; $C \to \emptyset$; $D \to \emptyset$;

2. $A \to BCD$; $B \to CD$
OR
$A \to B$; $B \to C$; $C \to D$; $D \to A$

3. $A \to D$; $B \to ACD$