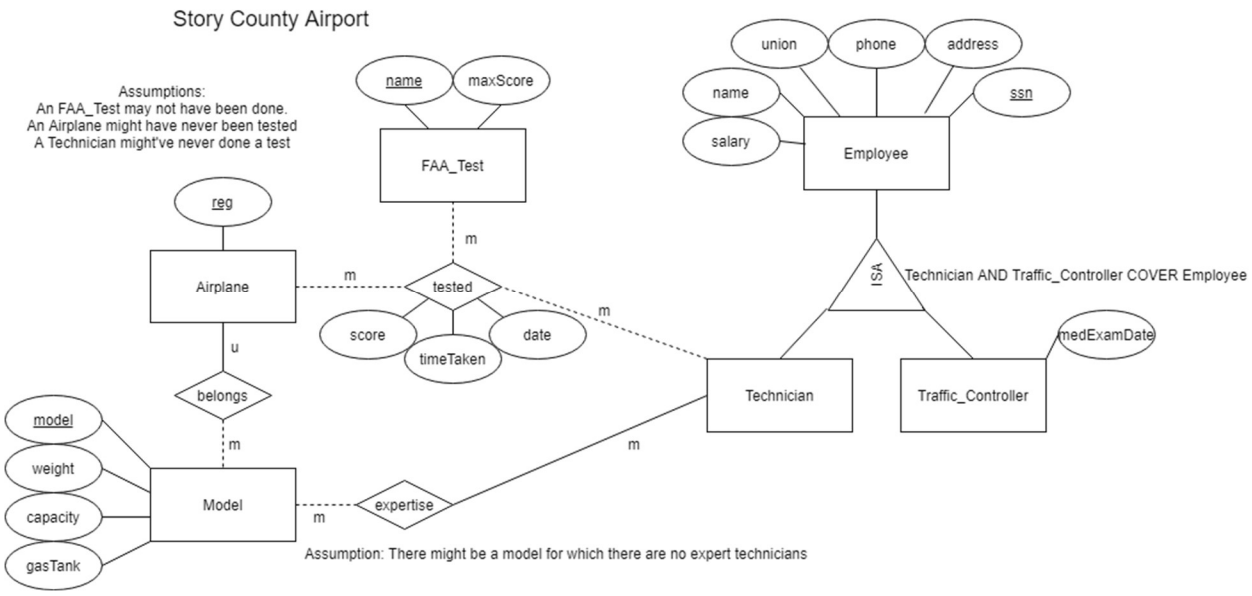
Question 1:



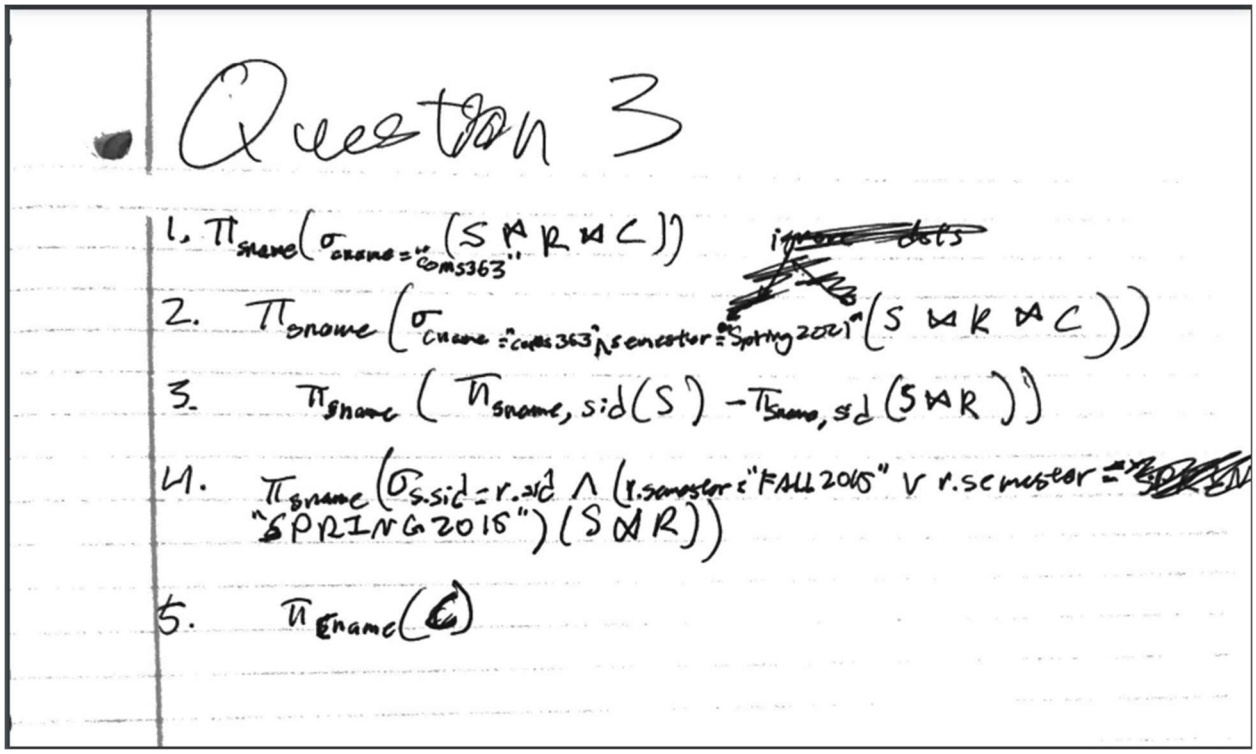

Question 2:

```
CREATE DATABASE IF NOT EXISTS exam1;
USE exam1;

CREATE TABLE IF NOT EXISTS Customer(
    cust_id int NOT NULL UNIQUE,
    name varchar(20),
    address varchar(50),
    amount double,
    PRIMARY KEY(cust_id)
);

# name of Group changed to ArtGroup because Group is a reserved MySQL keyword
CREATE TABLE IF NOT EXISTS ArtGroup(
    name varchar(10) NOT NULL UNIQUE,
    PRIMARY KEY(name)
```

```
);

CREATE TABLE IF NOT EXISTS Like_Group(
    groupName varchar(10),
    cust_id int,
    FOREIGN KEY(cust_id) REFERENCES Customer(cust_id),
    FOREIGN KEY(groupName) REFERENCES ArtGroup(name)
);

CREATE TABLE Artist(
    name varchar(20) NOT NULL,
    birthplace varchar(20),
    style varchar(10),
    age int,
    PRIMARY KEY(name)
);

CREATE TABLE IF NOT EXISTS Like_Artist(
    artistName varchar(20),
    cust_id int,
    FOREIGN KEY(cust_id) REFERENCES Customer(cust_id),
    FOREIGN KEY(artistName) REFERENCES Artist(name)
);

CREATE TABLE IF NOT EXISTS Artwork(
    title varchar(50) NOT NULL,
    price double,
    type varchar(10) NOT NULL,
```

```
    year int,
    creator varchar(20) NOT NULL,
    PRIMARY KEY(title),
    FOREIGN KEY(creator) REFERENCES Artist(name)
);

CREATE TABLE IF NOT EXISTS Paints(
    work varchar(50) NOT NULL UNIQUE,
    artist varchar(20) NOT NULL,
    FOREIGN KEY(artist) REFERENCES Artist(name),
    FOREIGN KEY(work) REFERENCES Artowrk(title)
);

CREATE TABLE IF NOT EXISTS Classify(
        classification varchar(10),
    work varchar(50) NOT NULL,
    FOREIGN KEY(classification) REFERENCES ArtGroup(name),
    FOREIGN KEY(work) REFERENCES Artwork(title)
);
```

Question 3


Question 3
1. $\pi_{sname}(\sigma_{cname="COMS363"}(S \bowtie R \bowtie C))$
2. $\pi_{sname}(\sigma_{cname="COMS363" \wedge semester="Spring 2021"}(S \bowtie R \bowtie C))$
3. $\pi_{sname}(\pi_{sname,sid}(S) - \pi_{sname,sid}(S \bowtie R))$
4. $\pi_{sname}(\sigma_{S.sid=r.sid \wedge (r.semester="FALL 2015" \vee r.semester="SPRING 2015")}(S \bowtie R))$
5. $\pi_{Ename}(E)$