Sayantan Chattopadhyay, 1000818145
Jay Ganguli, 1001575191

CSC343 Assignment 2 Relational Algebra

1. $\pi_{BusID,Age,Manufacturer}(\sigma_{AdvertisingRevenue>9000}(Bus))$

2. $\rho(YEAR, DATEDIFF(20180316, \sigma_{DateOfBirth}(Person)))$
   $\gamma_{COUNT(SID)}(\sigma_{Occupation="student" \vee YEAR<25}(Person))$

3. $\rho(YEAR, DATEDIFF(20180316, \sigma_{DateOfBirth}(Person)))$
   $\rho(st, \gamma_{COUNT(SID)}(\sigma_{Occupation="student" \vee YEAR<25}(Person))$
   $\rho(b, \sigma_{RouteID=5}(Bus))$
   $(st \bowtie b)$

4. $\rho(TotalRevenue, \gamma_{SUM(AdvertistingRevenue)}(Bus))$
   $\pi_{RouteID}$

5. PART A:
   D = $\gamma_{SIN,COUNT(*)\rightarrow Violations}(Driver \bowtie Violate)$

   $\pi_{d.SIN,FirstName,LastName}(\sigma_{d.Violations<3 \vee d.Violations=Null}($
   $Person \bowtie_{Person.SIN=D.SIN} D))$

   PART B:
   D = $\gamma_{SIN,COUNT(SIN)\rightarrow Violations,SUM(Demerit)\rightarrow TotalDemerit,SUM(Fine)\rightarrow TotalFine}($
   $Violate)$

   $\tau_{-D.TotalDemerit,-D.TotalFine}($
   $\pi_{D.SIN,FirstName,LastName,D.TotalDemerit,D.TotalFine}($
   $\sigma_{D.TotalDemerit>=2}(Person \bowtie_{Person.SIN=D.SIN} D)))$

6. T = $\gamma_{Manufacturer,COUNT(BusID)\rightarrow NumOfBuses}(Bus)$

   $\pi_{Bus.BusID,Bus.Manufacturer}(\sigma_{T.NumOfBuses=1}(Bus \bowtie T))$

7. PART A:
   Passes = $\pi_{SIN,Type,Fee}(Passenger \bowtie Fare)$

   $\gamma_{Type,SUM(Fee)\rightarrow revenue}(Passes)$

PART B:
FareRevenue = $\gamma_{Type,SUM(Fee)\rightarrow revenue}(Passes)$

$\sigma_{revenue>500}(FareRevenue)$

PART C:
FareRevenue = $\gamma_{Passenger.Type,SUM(Fee)\rightarrow revenue}(\sigma_{Take.Date='2017-05-01'}($
$Take \bowtie_{Take.SIN=Passenger.SIN} (Passenger \bowtie Fare)))$

$\gamma_{MAX(revenue)}(\pi_{Type\rightarrow MostProfitablePassengerType}(FareRevenue))$

8. PART A:
NumOfTrips = $\gamma_{RouteID,COUNT(*)\rightarrow times}(\sigma_{Date='2017-05-07'}(Bus \bowtie Take))$

$\gamma_{MAX(Times)\rightarrow times}(NumOfTrips)$

PART B:
Trips = $\gamma_{Date,COUNT(*)\rightarrow times}(Take)$

$\gamma_{MAX(times)\rightarrow times}(Trips)$

9. Routes = $\pi_{SIN,RouteID}(\sigma_{Date='2017-05-05'\vee Date='2017-05-06'}($
$Take \bowtie_{Take.BusID=Bus.BusID} Bus))$
LibRoutes = $\sigma_{SIName='CentralLibrary'\vee SIName='LockeLibrary'\vee SIName='WestdaleLibrary'}(Go)$

$\pi_{Occupation}(\gamma_{Occupation}(Person \bowtie_{Person.SIN=Routes.SIN} ($
$Routes \bowtie_{Routes.RoutesID=LibRoutes.RoutesID} LibRoutes)))$

10. D = $\pi_{SIN,SUM(Demerit)}(\sigma_{YearsOfService>5\wedge Salary>80000}($
$Driver \bowtie_{Driver.SIN=Violate.SIN} Violate))$

$\pi_{FirstName,LastName,SIN}(D \bowtie Person)$

11. Attendee = $\pi_{SIN}(\sigma_{Time<'18:50:00'\wedge RouteID=4}(Take \bowtie Bus))$
Students = $\pi_{SIN,FirstName,LastName,Sex}($
$\sigma_{Occupation='student'\vee YEAR<25}(Person))$

$\pi_{FirstName,LastName,Sex}(\sigma_{Students.SIN=Attendee}(StudentsXAttendee))$

12. $\pi_{RouteID,SName,ArrivalTime}($
$\sigma_{ArrivalTime>='16:20:00'\wedge ArrivalTime<='16:50:00'\wedge SIName='RonJoyceStadium'}($
$Schedule \bowtie Stop))$