CS 353 Spring 2021
Homework 1
Due: 12 February, Friday till midnight
You will use the Moodle course page for submission of this assignment

Q.1 [6 pts] Consider the following relations for a database that keeps track of business trips of salespersons in a sales office:

Salesperson(ssn, name, start_year, dept_no)
Trip(ssn, from_city, to_city, departure_date, return_date, trip_id)
Expense(trip_id, accountno, amount)

Specify the foreign keys for this schema, stating the assumptions you make.

Q.2 [6 pts] Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course:

Student(ssn, name, major, bdate)
Course(courseno, cname, dept)
Enroll(ssn, courseno, quarter, grade)
Book_Adoption(courseno, quarter, book_isbn)
Text(book_isbn, book_title, publisher, author)

Specify the foreign keys for this schema, stating the assumptions you make.

Q.3 [16 pts] Consider the following relations for a database that keeps track of auto sales in a car dealership (Option refers to some optional equipment installed on an auto):

Car(serial-no, model, manufacturer, price)
Option(serial-no, option_name, price)
Sale(salesperson_id, serial-no, date, sale_price)
Salesperson(salesperson_id, name, phone)

a) [5 pts] Specify the foreign keys for this schema, stating the assumptions you make.
b) [5 pts] Populate the relations with a few example tuples.
c) [6 pts] Give an example of an insertion into the Sale relation that violates the referential integrity constraints regarding the Salesperson relation and another insertion that does not.

Q.4 [72 pts, 8 pts each] Consider the following Mail Order relational schema describing the database for a mail order company.

Parts(pno, pname, qoh, price, qlevel)
Customers(cno, cname, street, zip, phone)
Employees(eno, ename, zip, hdate)
Zip_codes(zip, city)
Orders(ono, cno, eno, received, shipped)
Odetails(ono, pno, qty)

The attribute names are self-explanatory: qoh stands for *quantity on hand.* Specify the following queries in Relational Algebra.

a) Retrieve the numbers and names of parts that cost more than $50.00.
b) Retrieve the names and cities of employees who have taken orders for parts costing less than $100.00.
c) Retrieve the pairs of customer numbers of customers who live in the same ZIP Code.
d) Retrieve the names and phone numbers of customers who have ordered parts from employees living in New Orleans.
e) Retrieve the numbers and names of customers who have ordered parts costing more than $50.00.
f) Retrieve the numbers and names of customers who have not placed an order.
g) Retrieve the numbers and names of customers who placed at most one order.
h) Retrieve the names of customers who placed maximum number of orders for "Screwdriver" (pname).
i) Retrieve the names of customers who placed maximum total amount of orders (quantity) for "Screwdriver" (pname).