ICT2103: Information Management
Lab 4: SQL in Python

Objectives
Write SQL statements in Python environment to perform data definition
and manipulation operations.

Deliverables
You are required to finish the lab questions listed below and submit your
code file. All the questions shall be answered.

Format: **ONE (1) Jupyter** file.
Filename: <sid>_<name>_Lab4. ipynb, e.g., 2002103_ZhangWei_Lab4.ipynb.
Venue: Dropbox in xSiTe.
Deadline: the end of the week (Sunday, 23:59) when the lab is conducted.
Penalty: A penalty of 20% for wrong format or filename and 10% per day
for late submission will be imposed. A penalty of 100% for this lab will
be imposed for the 1st time plagiarism and a penalty of 100% for ALL the
labs for the 2nd time plagiarism.

Background Problem Statement
We learned how to write an object-oriented database in Python in our
first lab, without using SQL. We also learned how to code in SQL for
database management and operation in the following labs. Given the fact
that Python is becoming more and more prevalent, we are more likely to
deal with our databases in Python instead of the traditional SQL editors
in the future. In this lab, we aim to mix SQL and Python and learn how
to code SQL directly in Python, with certain Python library and functions.

Exercise: SQL in Python.
(Note: each question corresponds to a Jupyter cell.)

Q1. With Python library sqlite3, create (with connect) a database called
     "music<sid>.sqlite", e.g., music2002103.sqlite, and delete the table
     called "Tracks" if it exists. Then, you create a new table called
     "Tracks" with 2 columns, "title" as TEXT and "plays" as Integer.
     (You may think deleting Tracks in the beginning is unnecessary. Is
     this true?)

Q2. Insert 2 tuples shown below into the table "Tracks".
     ('Save Your Tears', 20)
     ('Levitating', 15)

Q3. Retrieve all tuples from the table, return them to a cursor, print
     the existing tuples row by row with a for-loop.

Q4. Retrieve all tuples from the table, return them to a cursor, print
     the 1st tuple with fetchone().

Q5. Retrieve all tuples from the table, return them to a cursor, print
     all tuples with fetchall(). (Do we need a for-loop?)

Q6. Update the plays of "Save Your Tears" from 20 to 5. Print the latest table.

Q7. Delete the tuples with plays equal to 5. Print the latest table.

Q8. 1) Create another database "order.db".
     2) Delete two tables "customers" and "orders" if any.
     3) Then, create table "customers" with 2 columns, "customer_id" as Integer as primary key and "customer_name" as TEXT.
     4) Create another table "orders" with 3 columns, "order_id" as TEXT as primary key, "customer_id" as Integer, and "amount" as DOUBLE. Meanwhile, specify a foreign key as "customer_id" referring to the "customer_id" in table "customers".

Q9. Insert the below tuples into table "customers". Print the latest table.
     (1, 'Arya')
     (2, 'Jon')
     (3, 'Robb')
     (4, '<your name>'), e.g., (4, 'Wei')

Q10. Insert the below tuples into table "orders". Print the latest table.
     ('O1', 1, 19.99)
     ('O2', 1, 66.66)
     ('O3', 3, 17.56)
     ('O4', 4, 88.88)

Q11. Join table "customers" and table "orders" together based on column "customer_id". Print the table after join with both tables' data. (Do we have any information about Jon in the output?)

Q12. In the above question, you practiced how to return multiple columns from different tables. Here, return the "customer_name" and "order_id" of all the orders each with an amount greater than 20.

------ END ------