Machine Problem 1

Requirement

- Write a program in C/C++ with the following functions:
  - Connect to/Create a SQLite database instance on a local file, which contains a table with 4 columns (ID, Name, GPA, Age)
  - Add a student to the table
  - Remove a student from the table
  - Given student ID, find the name of the student and his GPA and age
  - Close the database instance

How to Run the Code

```
make
./student
```

Test

- Test Case

```
SimpleController *c = new SimpleController("./database.db");
c->remove_table();
c->create_table();
c->insert(100, "Alice", 4.0, 18);
c->insert(200, "Bob", 3.9, 19);
c->insert(300, "Charles", 3.85, 20);
c->insert(400, "Dave", 3.8, 21);
c->select_all();
c->remove_by_id(200);
c->remove_by_id(150);
c->select_by_id(200);
c->select_by_id(100);
c->select_all();
delete c;
```

- Output

```
(base) ➜  MP1-SQLite git:(master) ✗ ./student
[INFO] Database ./database.db is opened.
>>> DROP TABLE IF EXISTS Students;
[INFO] Table Students is removed
>>> CREATE TABLE IF NOT EXISTS Students (ID INT, Name TEXT, GPA REAL, Age INT);
[INFO] Table Students is created
>>> INSERT INTO Students (ID, Name, GPA, Age) VALUES (100, 'Alice', 4.000000, 18);
>>> INSERT INTO Students (ID, Name, GPA, Age) VALUES (200, 'Bob', 3.900000, 19);
>>> INSERT INTO Students (ID, Name, GPA, Age) VALUES (300, 'Charles', 3.850000, 20);
>>> INSERT INTO Students (ID, Name, GPA, Age) VALUES (400, 'Dave', 3.800000, 21);
>>> SELECT ID, Name, GPA, Age FROM Students
ID = 100 | Name = Alice | GPA = 4 | Age = 18
ID = 200 | Name = Bob | GPA = 3.9 | Age = 19
ID = 300 | Name = Charles | GPA = 3.85 | Age = 20
ID = 400 | Name = Dave | GPA = 3.8 | Age = 21
>>> DELETE FROM Students WHERE ID = 200;
>>> DELETE FROM Students WHERE ID = 150;
>>> SELECT Name, GPA, Age FROM Students WHERE ID = 200;
Not Found.
>>> SELECT Name, GPA, Age FROM Students WHERE ID = 100;
Name = Alice | GPA = 4 | Age = 18
>>> SELECT ID, Name, GPA, Age FROM Students
ID = 100 | Name = Alice | GPA = 4 | Age = 18
ID = 300 | Name = Charles | GPA = 3.85 | Age = 20
ID = 400 | Name = Dave | GPA = 3.8 | Age = 21
(base) ➜  MP1-SQLite git:(master) ✗
```

- Explanation
  - Initially, we clear the table Student by dropping and creating it.
  - In the four INSERT operations, Four students are added.
  - In the two DELETE operations, #200 is deleted and #150 is ignored since there is no such student.
  - In the two SELECT operations, #200 is not in the table and #100 is Alice.
  - Finally, there are three students left. And the destructor is called followed by exiting.