Imagine you have a matrix represented as a numpy array, and your task is to find the sum of its diagonal elements using a loop

Input:

```
import numpy as np
n = int(input("Enter the order of the square matrix (n): "))
matrix = np.zeros((n, n), dtype=int)  # Create an empty n x n matrix
print(f"Enter the {n}x{n} matrix values row-wise:")
for i in range(n):
    row = list(map(int, input().split()))  # Take space-separated row input
    matrix[i] = row  # Assign the row to the matrix
diagonal_sum = 0
for i in range(n):
    diagonal_sum += matrix[i][i]  # Sum of main diagonal elements
print("\nMatrix:")
print(matrix)
print("\nSum of diagonal elements:", diagonal_sum)
```

Output:

```
Enter the order of the square matrix (n):  3
Enter the 3x3 matrix values row-wise:
 1 2 3
 4 5 6
 7 8 9

Matrix:
[[1 2 3]
 [4 5 6]
 [7 8 9]]

Sum of diagonal elements: 15
```

Perform SQL queries to create tables and extract meaningful information from a Student and Course database.

Input:

```
import sqlite3
```

```
# Step 1: Connect to SQLite database (or create it)
conn = sqlite3.connect("library.db")
cursor = conn.cursor()

# Step 2: Create Student Table
cursor.execute("""
  CREATE TABLE IF NOT EXISTS Student (
    RollNo INTEGER PRIMARY KEY,
    Name TEXT,
    Marks INTEGER,
    Aadhar_Number TEXT UNIQUE,
    Address TEXT
  )
""")

# Step 3: Create Course Table
cursor.execute("""
  CREATE TABLE IF NOT EXISTS Course (
    RollNo INTEGER,
    Course TEXT,
    Course_Duration TEXT,
    FOREIGN KEY (RollNo) REFERENCES Student(RollNo)
  )
""")

# Step 4: Insert Sample Data into Student Table
students = [
  (101, 'Rajesh Kumar', 85, '123456789012', 'Delhi'),
  (102, 'Ravi Sharma', 28, '234567890123', 'Mumbai'),
  (103, 'Amit Patel', 90, '345678901234', 'Ahmedabad'),
  (104, 'Rahul Verma', 72, '456789012345', 'Kolkata'),
```

```
    (105, 'Pooja Singh', 20, '567890123456', 'Chennai')
]

cursor.executemany("INSERT OR IGNORE INTO Student VALUES (?, ?, ?, ?, ?)", students)

# Step 5: Insert Sample Data into Course Table
courses = [
    (101, 'B.Tech', '4 Years'),
    (102, 'B.Sc', '3 Years'),
    (103, 'BCA', '3 Years'),
    (104, 'B.Com', '3 Years'),
    (105, 'BCA', '3 Years')
]

cursor.executemany("INSERT OR IGNORE INTO Course VALUES (?, ?, ?)", courses)

# Step 6: Query - Calculate the average of marks
cursor.execute("SELECT AVG(Marks) FROM Student")
average_marks = cursor.fetchone()[0]
print("Average Marks:", average_marks)

# Step 7: Query - Arrange names in ascending order
cursor.execute("SELECT Name FROM Student ORDER BY Name ASC")
sorted_names = cursor.fetchall()
print("\nNames in Ascending Order:")
for name in sorted_names:
    print(name[0])

# Step 8: Query - Extract RollNo and Names of students scoring below 30
cursor.execute("SELECT RollNo, Name FROM Student WHERE Marks < 30")
low_score_students = cursor.fetchall()
```

```
print("\nStudents Scoring Below 30:")
for student in low_score_students:
    print(student)

# Step 9: Query - Extract RollNo of students whose names start with 'R'
cursor.execute("SELECT RollNo FROM Student WHERE Name LIKE 'R%'")
students_with_R = cursor.fetchall()
print("\nRoll Numbers of Students Whose Names Start with 'R':")
for roll in students_with_R:
    print(roll[0])

# Step 10: Query - Extract RollNo of students pursuing BCA
cursor.execute("SELECT RollNo FROM Course WHERE Course = 'BCA'")
bca_students = cursor.fetchall()
print("\nRoll Numbers of Students Pursuing BCA:")
for roll in bca_students:
    print(roll[0])

# Step 11: Display all Student records (for reference)
cursor.execute("SELECT * FROM Student")
print("\nStudent Table Data:")
for row in cursor.fetchall():
    print(row)

# Step 12: Display all Course records (for reference)
cursor.execute("SELECT * FROM Course")
print("\nCourse Table Data:")
for row in cursor.fetchall():
    print(row)
# Commit and close connection
conn.commit()
```

conn.close()

Output:

```
Average Marks: 59.0

Names in Ascending Order:
Amit Patel
Pooja Singh
Rahul Verma
Rajesh Kumar
Ravi Sharma

Students Scoring Below 30:
(102, 'Ravi Sharma')
(105, 'Pooja Singh')

Roll Numbers of Students Whose Names Start with 'R':
101
102
104

Roll Numbers of Students Pursuing BCA:
103
105

Student Table Data:
(101, 'Rajesh Kumar', 85, '123456789012', 'Delhi')
(102, 'Ravi Sharma', 28, '234567890123', 'Mumbai')
(103, 'Amit Patel', 90, '345678901234', 'Ahmedabad')
(104, 'Rahul Verma', 72, '456789012345', 'Kolkata')
(105, 'Pooja Singh', 20, '567890123456', 'Chennai')

Course Table Data:
(101, 'B.Tech', '4 Years')
(102, 'B.Sc', '3 Years')
(103, 'BCA', '3 Years')
(104, 'B.Com', '3 Years')
(105, 'BCA', '3 Years')
```