```
import sqlite3
import pandas as pd

# Create in-memory database
conn = sqlite3.connect(':memory:')
cursor = conn.cursor()
```

```
cursor.executescript("""
CREATE TABLE Customerrs (
    customer_id INT PRIMARY KEY,
    name TEXT NOT NULL,
    email TEXT UNIQUE NOT NULL,
    country TEXT
);

INSERT INTO Customerrs VALUES
(1,'Alice Johnson', 'alice@example.com', 'USA'),
(2,'Bob Smith', 'bob@example.com', 'Canada'),
(3,'Carlos Gomez', 'carlos@example.com', 'Mexico'),
(4,'Diana Wu', 'diana@example.com', 'China'),
(5,'Ethan Brown', 'ethan@example.com', 'UK');

CREATE TABLE Productt (
    product_id INT PRIMARY KEY,
    product_name TEXT NOT NULL,
    category TEXT,
    price DECIMAL(10,2) NOT NULL
);

INSERT INTO Productt VALUES
(1,'Wireless Mouse', 'Electronics', 25.99),
(2,'Bluetooth Speaker', 'Electronics', 49.99),
(3,'Yoga Mat', 'Fitness', 19.99),
(4,'Coffee Maker', 'Home Appliances', 79.50),
(5,'Notebook', 'Stationery', 3.25);

CREATE TABLE Orderc (
    order_id INT PRIMARY KEY,
    customer_id INT,
    order_date TEXT NOT NULL,
    total_amount DECIMAL(12,2),
    FOREIGN KEY (customer_id) REFERENCES Customerrs(customer_id)
);

INSERT INTO Orderc VALUES
(101,1,'2025-03-20',150.50),
(102,2,'2025-03-21',80.00);

CREATE TABLE OrderDetails (
    order_detail_id INT PRIMARY KEY,
    order_id INT,
    product_id INT,
    quantity INT NOT NULL,
    price DECIMAL(10,2) NOT NULL,
    FOREIGN KEY (order_id) REFERENCES Orderc(order_id),
    FOREIGN KEY (product_id) REFERENCES Productt(product_id)
);

INSERT INTO OrderDetails VALUES
(1,101,2,1,49.99),
(2,102,1,2,25.99);
""")
conn.commit()
```

```
query = """
SELECT customer_id, COUNT(order_id) AS total_orders
FROM Orderc
GROUP BY customer_id
ORDER BY total_orders DESC;
"""
pd.read_sql_query(query, conn)
```

	customer_id	total_orders
0	2	1
1	1	1

```
pd.read_sql_query("""
SELECT o.order_id, o.order_date, c.name, c.country
FROM Orderc o
INNER JOIN Customerrs c ON o.customer_id = c.customer_id;
""", conn)
```

	order_id	order_date	name	country
0	101	2025-03-20	Alice Johnson	USA
1	102	2025-03-21	Bob Smith	Canada

```
pd.read_sql_query("""
SELECT p.product_name, od.quantity
FROM Productt p
LEFT JOIN OrderDetails od ON p.product_id = od.product_id;
""", conn)
```

	product_name	quantity
0	Wireless Mouse	2.0
1	Bluetooth Speaker	1.0
2	Yoga Mat	NaN
3	Coffee Maker	NaN
4	Notebook	NaN

```
pd.read_sql_query("""
SELECT od.order_id, od.quantity, p.product_name, p.category
FROM Productt p
LEFT JOIN OrderDetails od ON p.product_id = od.product_id
WHERE od.order_id IS NOT NULL;
""", conn)
```

	order_id	quantity	product_name	category
0	101	1	Bluetooth Speaker	Electronics
1	102	2	Wireless Mouse	Electronics

```
pd.read_sql_query("""
SELECT name
FROM Customerrs
WHERE customer_id IN (
    SELECT customer_id FROM Orderc
    GROUP BY customer_id
    HAVING COUNT(order_id) > 0
);
""", conn)
```

	name
0	Alice Johnson
1	Bob Smith

```
pd.read_sql_query("""
SELECT c.country, SUM(o.total_amount) AS total_sales
FROM Orderc o
JOIN Customerrs c ON o.customer_id = c.customer_id
GROUP BY c.country
ORDER BY total_sales DESC;
""", conn)
```

	country	total_sales
0	USA	150.5
1	Canada	80.0

```
cursor.executescript("""
CREATE VIEW SalesSummary AS
SELECT p.category, SUM(od.price * od.quantity) AS total_revenue
FROM OrderDetails od
JOIN Productt p ON od.product_id = p.product_id
GROUP BY p.category;
""")

pd.read_sql_query("SELECT * FROM SalesSummary;", conn)
```

	category	total_revenue
0	Electronics	101.97

```
cursor.execute("CREATE INDEX idx_customer_country ON Customerrs(country);")
conn.commit()

pd.read_sql_query("PRAGMA index_list('Customerrs');", conn)
```

	seq	name	unique	origin	partial
0	0	idx_customer_country	0	c	0
1	1	sqlite_autoindex_Customerrs_2	1	u	0
2	2	sqlite_autoindex_Customerrs_1	1	pk	0