Query 1: Which book is the most popular and how much did it sell for?

Plain English:
Retrieve the title of the book that is rated as the most popular (popularity = 10) along with its total sales revenue (from profit tracking).

Relational Algebra:
π_{Title, SalesTotal} (σ_{Popularity = 10} (bookDemand ⋈ profitMargin ⋈ book))

SQL:

```
SELECT b.Title, pm.SalesTotal
FROM book AS b
JOIN bookDemand AS bd ON b.ISBN = bd.ISBN
JOIN profitMargin AS pm ON b.ISBN = pm.ISBN
WHERE bd.Popularity = 10;
```

Query 2: Who is the author of the most purchased book?

Plain English:
Determine which book has been purchased the most by summing the quantities from all order items. Then, retrieve that book's ISBN, title, the total quantity sold, and the name(s) of its author(s).

Relational Algebra:
Let Agg = γ_{ISBN; TotalQuantity ← SUM(Quantity)} (orderItem)
Let MaxAgg = σ_{TotalQuantity = max(Agg.TotalQuantity)} (Agg)
Result = π_{ISBN, Title, TotalQuantity, Name} (MaxAgg ⋈ book ⋈ book_author ⋈ author)

SQL:

```
WITH TotalSales AS (
SELECT ISBN, SUM(Quantity) AS TotalQuantity
FROM orderItem
GROUP BY ISBN
),
MaxSales AS (
SELECT ISBN, TotalQuantity
FROM TotalSales
WHERE TotalQuantity = (SELECT MAX(TotalQuantity) FROM TotalSales)
)
SELECT b.ISBN, b.Title, ms.TotalQuantity, a.Name
FROM MaxSales AS ms
JOIN book AS b ON ms.ISBN = b.ISBN
```

```
JOIN book_author AS ba ON b.ISBN = ba.ISBN
JOIN author AS a ON ba.AuthorID = a.AuthorID;
```

Query 3: Find the name and profit margin of the least popular book.

Plain English:
Find the book with the lowest popularity rating. Then, retrieve the title of that book and its profit margin (calculated as SalesTotal minus CostTotal from the profit tracking).

Relational Algebra:
Let L = σ_{Popularity = min(Popularity)} (bookDemand)
Result = π_{Title, (SalesTotal - CostTotal)} (L ⋈ book ⋈ profitMargin)

SQL:

```
SELECT b.Title, (pm.SalesTotal - pm.CostTotal) AS ProfitMargin
FROM book AS b
JOIN bookDemand AS bd ON b.ISBN = bd.ISBN
JOIN profitMargin AS pm ON b.ISBN = pm.ISBN
WHERE bd.Popularity = (SELECT MIN(Popularity) FROM bookDemand);
```