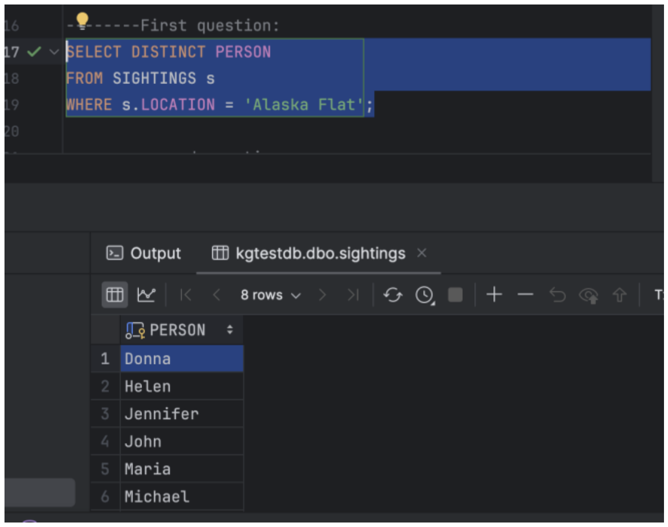
1. **Who has seen a flower at Alaska Flat?**

SQL Query:

```
SELECT DISTINCT PERSON
FROM SIGHTINGS s
WHERE s.LOCATION = 'Alaska Flat';
```

Executed Picture:



```
------First question:
SELECT DISTINCT PERSON
FROM SIGHTINGS s
WHERE s.LOCATION = 'Alaska Flat';
```

```
  PERSON
1 Donna
2 Helen
3 Jennifer
4 John
5 Maria
6 Michael
```

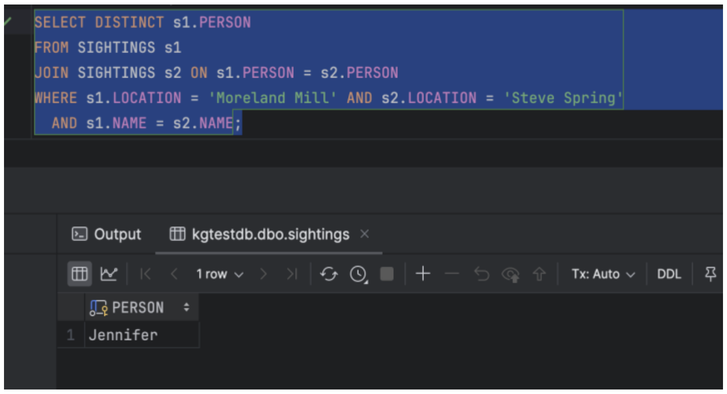
Solution:
Donna
Helen
Jennifer
John
Maria
Michael
Robert
Sandra

2. Who has seen the same flower at both Moreland Mill and at Steve Spring?

SQL Query:

```
SELECT DISTINCT s1.PERSON
FROM SIGHTINGS s1
JOIN SIGHTINGS s2 ON s1.PERSON = s2.PERSON
WHERE s1.LOCATION = 'Moreland Mill' AND s2.LOCATION = 'Steve Spring'
  AND s1.NAME = s2.NAME;
```

Executed Picture:



```
SELECT DISTINCT s1.PERSON
FROM SIGHTINGS s1
JOIN SIGHTINGS s2 ON s1.PERSON = s2.PERSON
WHERE s1.LOCATION = 'Moreland Mill' AND s2.LOCATION = 'Steve Spring'
  AND s1.NAME = s2.NAME;
```

```
  PERSON
1 Jennifer
```

Solution:
Jennifer

3. What is the scientific name for each of the different flowers that have been sighted by either Michael or Robert above 8250 feet in elevation?

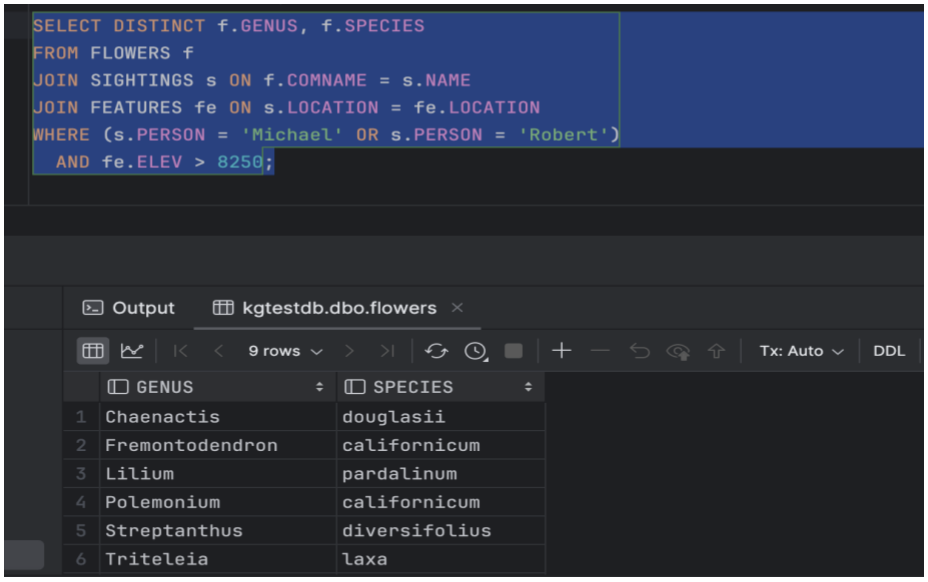
SQL Query:

```sql
SELECT DISTINCT f.GENUS, f.SPECIES
FROM FLOWERS f
JOIN SIGHTINGS s ON f.COMNAME = s.NAME
JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
WHERE (s.PERSON = 'Michael' OR s.PERSON = 'Robert')
  AND fe.ELEV > 8250;
```

Or

```sql
SELECT DISTINCT f.GENUS, f.SPECIES
FROM FLOWERS f
JOIN SIGHTINGS s ON f.COMNAME = s.NAME
JOIN PEOPLE p ON s.PERSON = p.PERSON
JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
WHERE (p.PERSON = 'Michael' OR p.PERSON = 'Robert')
  AND fe.ELEV > 8250;
```

Executed Picture:



```
SELECT DISTINCT f.GENUS, f.SPECIES
FROM FLOWERS f
JOIN SIGHTINGS s ON f.COMNAME = s.NAME
JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
WHERE (s.PERSON = 'Michael' OR s.PERSON = 'Robert')
  AND fe.ELEV > 8250;
```

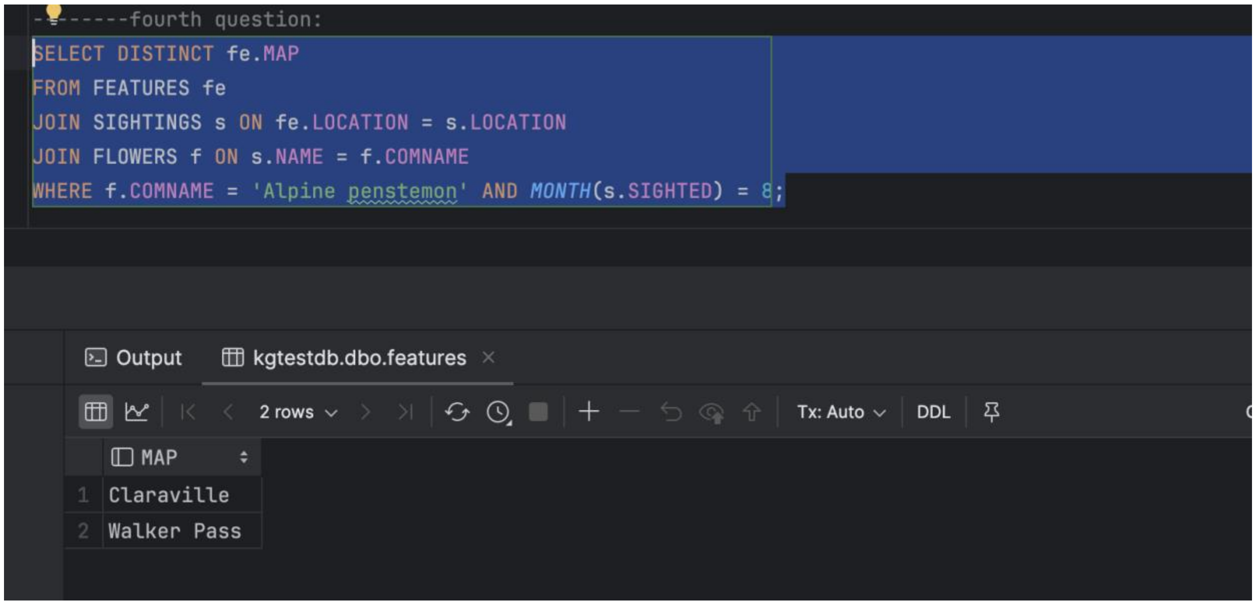
```
  GENUS           SPECIES
1 Chaenactis      douglasii
2 Fremontodendron californicum
3 Lilium          pardalinum
4 Polemonium      californicum
5 Streptanthus    diversifolius
6 Triteleia       laxa
```

Solution:
Chaenactis,douglasii
Fremontodendron,californicum
Lilium,pardalinum
Polemonium,californicum
Streptanthus,diversifolius
Triteleia,laxa
Viola,quercetorum
Viola,sheltonii
Zigadenus,venenosus

4. Which maps hold a location where someone has seen Alpine penstemon in August?

SQL Query:
```
SELECT DISTINCT fe.MAP
FROM FEATURES fe
JOIN SIGHTINGS s ON fe.LOCATION = s.LOCATION
JOIN FLOWERS f ON s.NAME = f.COMNAME
WHERE f.COMNAME = 'Alpine penstemon' AND MONTH(s.SIGHTED) = 8;
```

Executed Picture:



```
------fourth question:
SELECT DISTINCT fe.MAP
FROM FEATURES fe
JOIN SIGHTINGS s ON fe.LOCATION = s.LOCATION
JOIN FLOWERS f ON s.NAME = f.COMNAME
WHERE f.COMNAME = 'Alpine penstemon' AND MONTH(s.SIGHTED) = 8;
```

```
  MAP
1 Claraville
2 Walker Pass
```

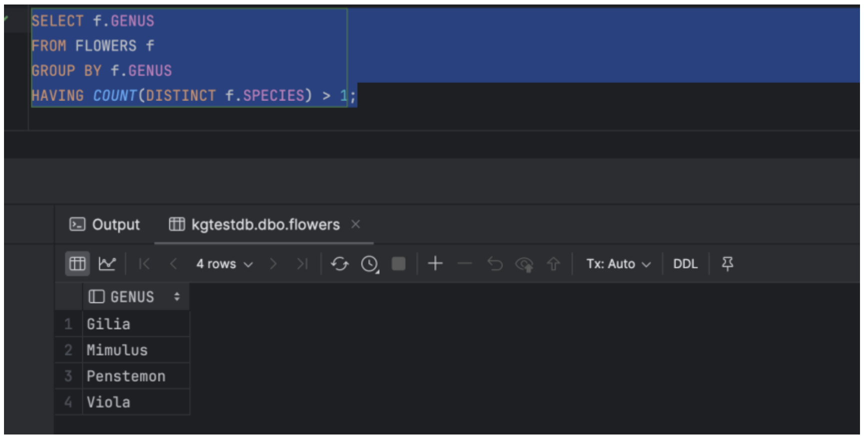
Solution:
Claraville
Walker Pass

5. Which genus has more than one species recorded in the SSWC database?

SQL Query:

```
SELECT f.GENUS
FROM FLOWERS f
GROUP BY f.GENUS
HAVING COUNT(DISTINCT f.SPECIES) > 1;
```

Executed Picture:



```
SELECT f.GENUS
FROM FLOWERS f
GROUP BY f.GENUS
HAVING COUNT(DISTINCT f.SPECIES) > 1;
```

```
  GENUS
1 Gilia
2 Mimulus
3 Penstemon
4 Viola
```

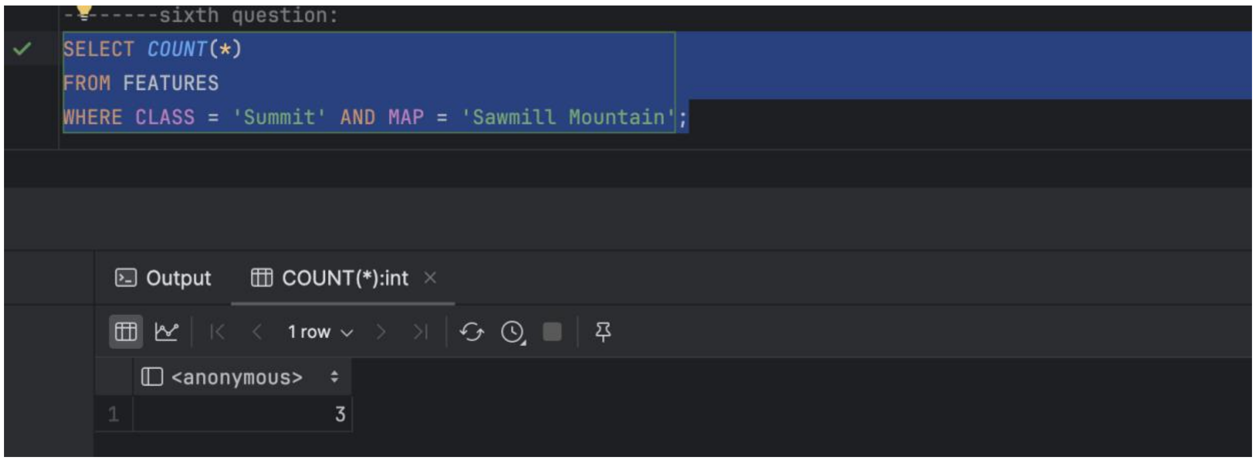
Solution:
Gilia
Mimulus
Penstemon
Viola

6. How many summits are on the Sawmill Mountain map?

SQL Query:

```
SELECT COUNT(*)
FROM FEATURES
WHERE CLASS = 'Summit' AND MAP = 'Sawmill Mountain';
```

Executed Picture:



```
--------sixth question:
SELECT COUNT(*)
FROM FEATURES
WHERE CLASS = 'Summit' AND MAP = 'Sawmill Mountain';
```

```
  <anonymous>
1           3
```

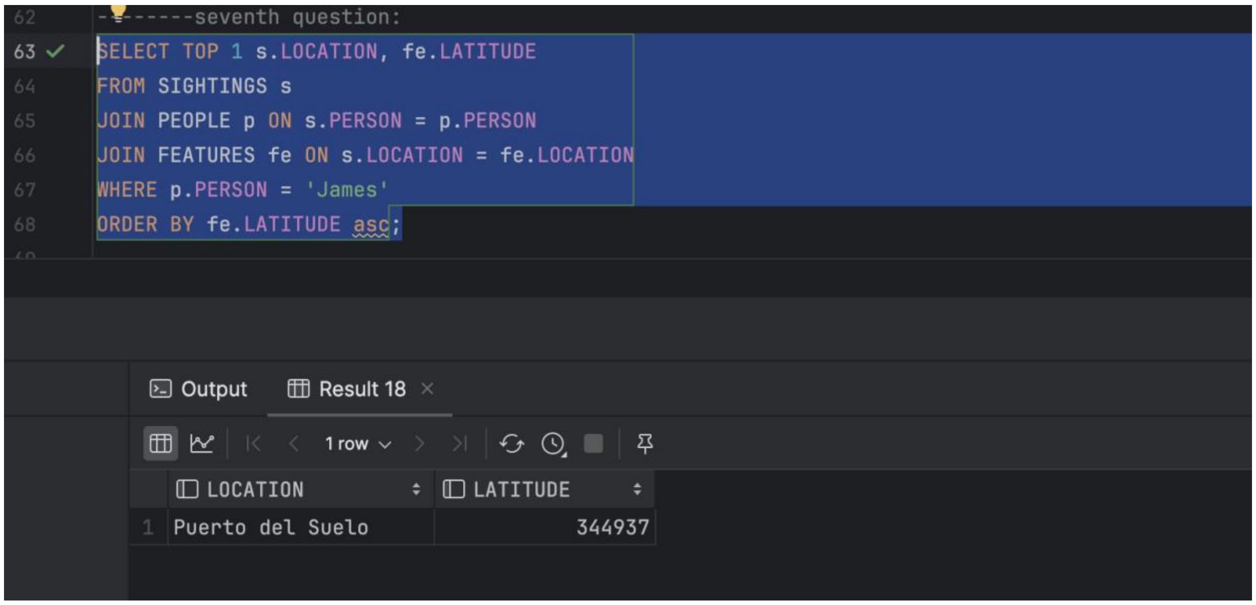
Solution:
3

7. What is the furthest south location where James has seen a flower? “Furthest south” means lowest latitude.

SQL Query:

```
SELECT TOP 1 s.LOCATION, fe.LATITUDE
FROM SIGHTINGS s
JOIN PEOPLE p ON s.PERSON = p.PERSON
JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
WHERE p.PERSON = 'James'
ORDER BY fe.LATITUDE asc;
```

Executed Picture:


```
--------seventh question:
SELECT TOP 1 s.LOCATION, fe.LATITUDE
FROM SIGHTINGS s
JOIN PEOPLE p ON s.PERSON = p.PERSON
JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
WHERE p.PERSON = 'James'
ORDER BY fe.LATITUDE asc;
```

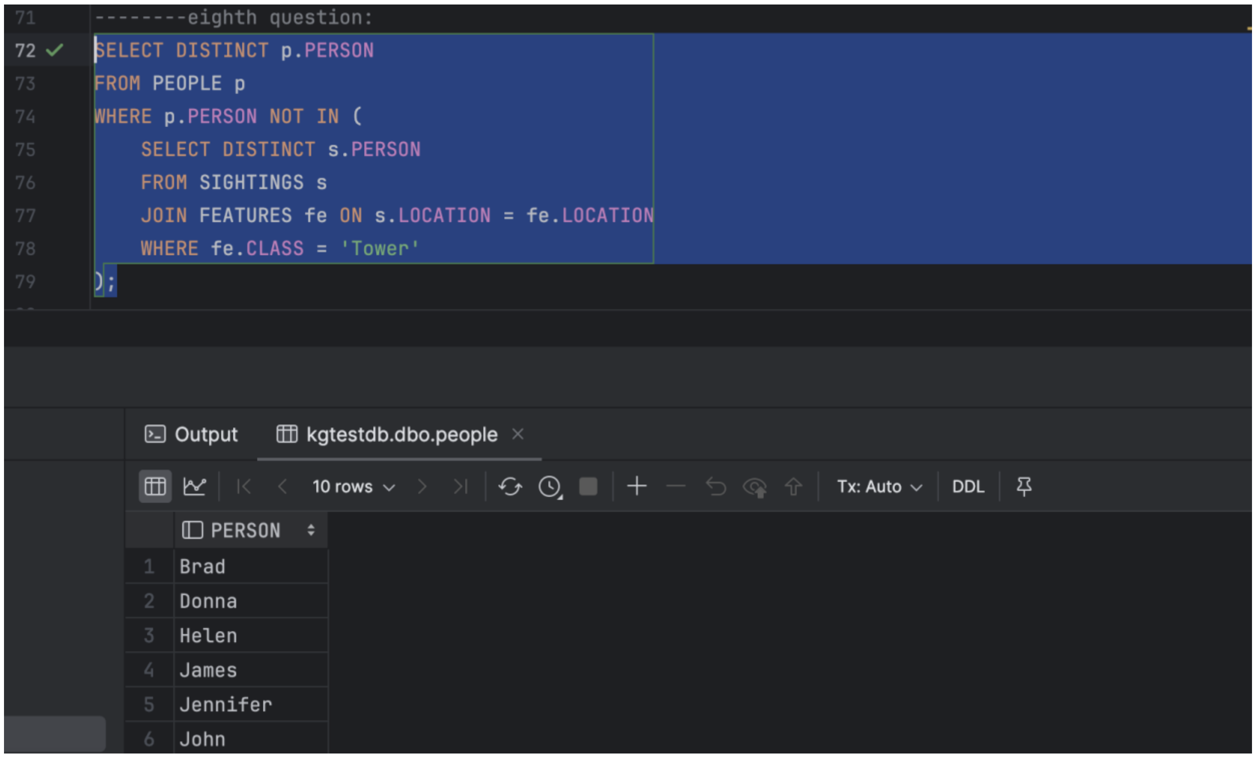
```
  LOCATION          LATITUDE
1 Puerto del Suelo    344937
```

Solution:
Puerto del Suelo,344937

8. Who has not seen a flower at a location of class Tower?

SQL Query:
```
SELECT DISTINCT p.PERSON
FROM PEOPLE p
WHERE p.PERSON NOT IN (
    SELECT DISTINCT s.PERSON
    FROM SIGHTINGS s
    JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
    WHERE fe.CLASS = 'Tower'
);
```

Executed Picture:



```sql
--------eighth question:
SELECT DISTINCT p.PERSON
FROM PEOPLE p
WHERE p.PERSON NOT IN (
    SELECT DISTINCT s.PERSON
    FROM SIGHTINGS s
    JOIN FEATURES fe ON s.LOCATION = fe.LOCATION
    WHERE fe.CLASS = 'Tower'
);
```

```
   PERSON
1  Brad
2  Donna
3  Helen
4  James
5  Jennifer
6  John
```

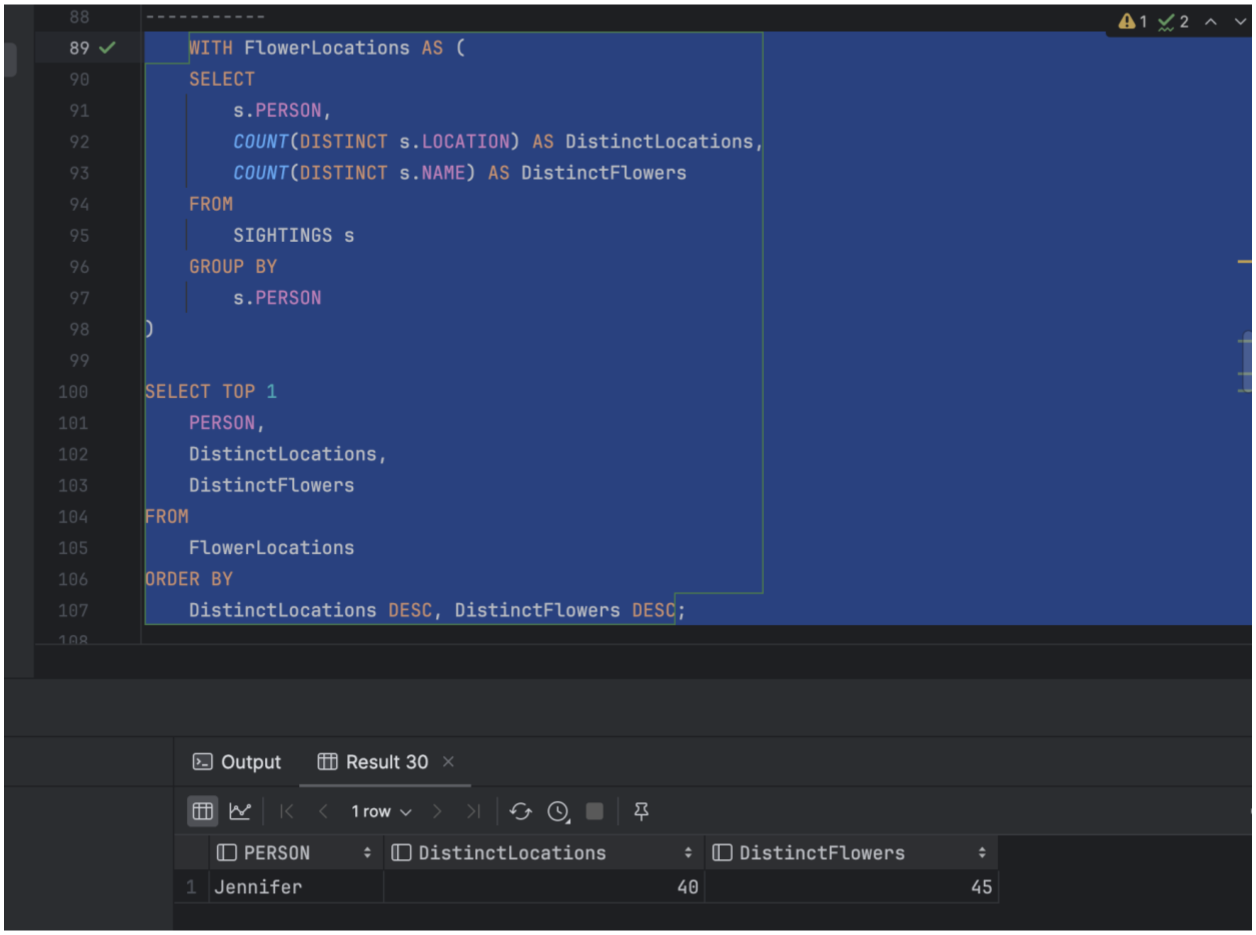
Solution:
Brad
Donna
Helen
James
Jennifer
John
Pete
Robert
Sandra
Tim

9. Who has seen flowers at the most distinct locations, and how many flowers were that?

SQL Query:

```sql
    WITH FlowerLocations AS (
    SELECT
        s.PERSON,
        COUNT(DISTINCT s.LOCATION) AS DistinctLocations,
        COUNT(DISTINCT s.NAME) AS DistinctFlowers
    FROM
        SIGHTINGS s
    GROUP BY
        s.PERSON
)

SELECT TOP 1
    PERSON,
    DistinctLocations,
    DistinctFlowers
FROM
    FlowerLocations
ORDER BY
    DistinctLocations DESC, DistinctFlowers DESC;
```

Executed Picture:



```
-----------
WITH FlowerLocations AS (
    SELECT
        s.PERSON,
        COUNT(DISTINCT s.LOCATION) AS DistinctLocations,
        COUNT(DISTINCT s.NAME) AS DistinctFlowers
    FROM
        SIGHTINGS s
    GROUP BY
        s.PERSON
)

SELECT TOP 1
    PERSON,
    DistinctLocations,
    DistinctFlowers
FROM
    FlowerLocations
ORDER BY
    DistinctLocations DESC, DistinctFlowers DESC;
```

```
  PERSON     DistinctLocations    DistinctFlowers
1 Jennifer                  40                 45
```

Solution:

(I even provided location along with no. of flowers)

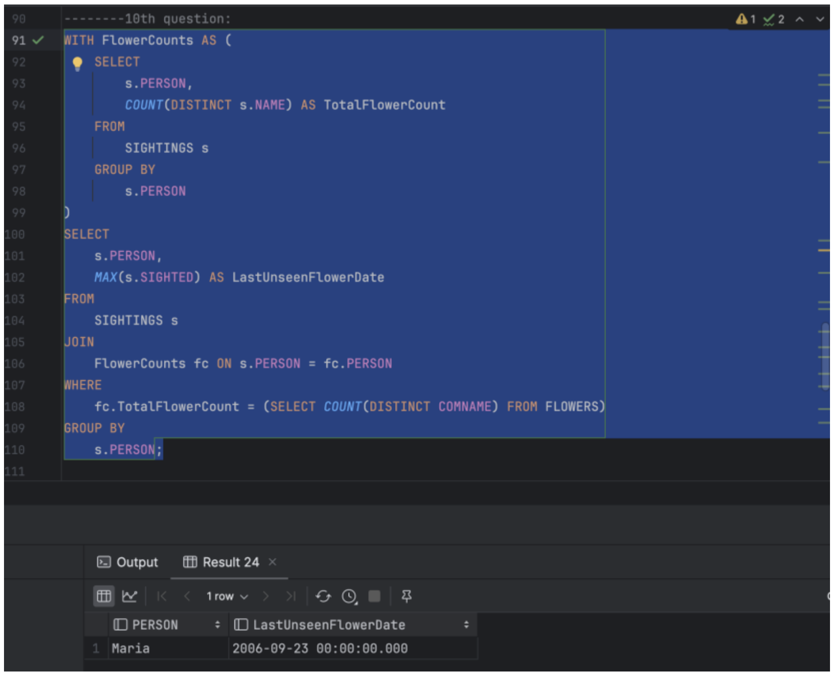
Jennifer,40,45

10. For those people who have seen all the flowers in the SSWC database, what was the date on which they saw their last unseen flower? In other words, at which date did they finish observing all of the flowers in the database?

SQL Query:

```
WITH FlowerCounts AS (
    SELECT
        s.PERSON,
        COUNT(DISTINCT s.NAME) AS TotalFlowerCount
    FROM
        SIGHTINGS s
    GROUP BY
        s.PERSON
)
SELECT
    s.PERSON,
    MAX(s.SIGHTED) AS LastUnseenFlowerDate
FROM
    SIGHTINGS s
JOIN
    FlowerCounts fc ON s.PERSON = fc.PERSON
WHERE
    fc.TotalFlowerCount = (SELECT COUNT(DISTINCT COMNAME) FROM FLOWERS)
GROUP BY
    s.PERSON;
```

Executed Picture:



```
--------10th question:
WITH FlowerCounts AS (
    SELECT
        s.PERSON,
        COUNT(DISTINCT s.NAME) AS TotalFlowerCount
    FROM
        SIGHTINGS s
    GROUP BY
        s.PERSON
)
SELECT
    s.PERSON,
    MAX(s.SIGHTED) AS LastUnseenFlowerDate
FROM
    SIGHTINGS s
JOIN
    FlowerCounts fc ON s.PERSON = fc.PERSON
WHERE
    fc.TotalFlowerCount = (SELECT COUNT(DISTINCT COMNAME) FROM FLOWERS)
GROUP BY
    s.PERSON;
```

```
  PERSON   LastUnseenFlowerDate
1 Maria    2006-09-23 00:00:00.000
```

Solution:

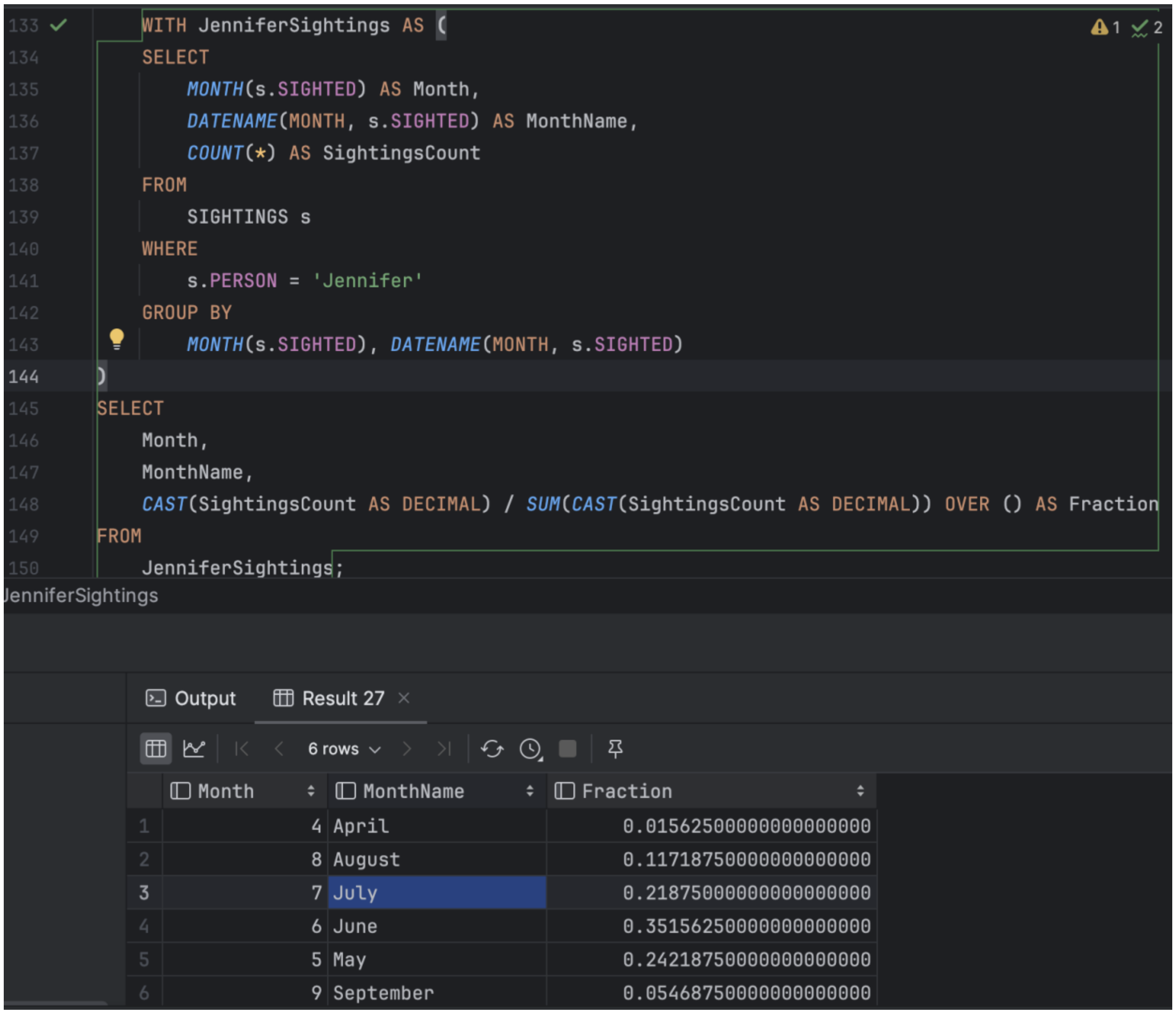
Maria,2006-09-23 00:00:00.000

11. For Jennifer, compute the fraction of her sightings on a per-month basis. For example, we might get {(September, .12), (October, .74), (November, .14)}. The fractions should add up to one across all months.

SQL Query:

```
WITH JenniferSightings AS (
    SELECT
        MONTH(s.SIGHTED) AS Month,
        DATENAME(MONTH, s.SIGHTED) AS MonthName,
        COUNT(*) AS SightingsCount
    FROM
        SIGHTINGS s
    WHERE
        s.PERSON = 'Jennifer'
    GROUP BY
        MONTH(s.SIGHTED), DATENAME(MONTH, s.SIGHTED)
)

SELECT
    Month,
    MonthName,
    CAST(SightingsCount AS DECIMAL) / SUM(CAST(SightingsCount AS DECIMAL))
OVER () AS Fraction
FROM
    JenniferSightings;
```

Executed Picture:



```
WITH JenniferSightings AS (
    SELECT
        MONTH(s.SIGHTED) AS Month,
        DATENAME(MONTH, s.SIGHTED) AS MonthName,
        COUNT(*) AS SightingsCount
    FROM
        SIGHTINGS s
    WHERE
        s.PERSON = 'Jennifer'
    GROUP BY
        MONTH(s.SIGHTED), DATENAME(MONTH, s.SIGHTED)
)
SELECT
    Month,
    MonthName,
    CAST(SightingsCount AS DECIMAL) / SUM(CAST(SightingsCount AS DECIMAL)) OVER () AS Fraction
FROM
    JenniferSightings;
```

JenniferSightings

	Month	MonthName	Fraction
1	4	April	0.01562500000000000000
2	8	August	0.11718750000000000000
3	7	July	0.21875000000000000000
4	6	June	0.35156250000000000000
5	5	May	0.24218750000000000000
6	9	September	0.05468750000000000000

Solution:
(I even added Month for reference) -
Month,MonthName,Fraction
4,April,0.01562500000000000000
8,August,0.11718750000000000000
7,July,0.21875000000000000000
6,June,0.35156250000000000000

5,May,0.2421875000000000000
9,September,0.0546875000000000000

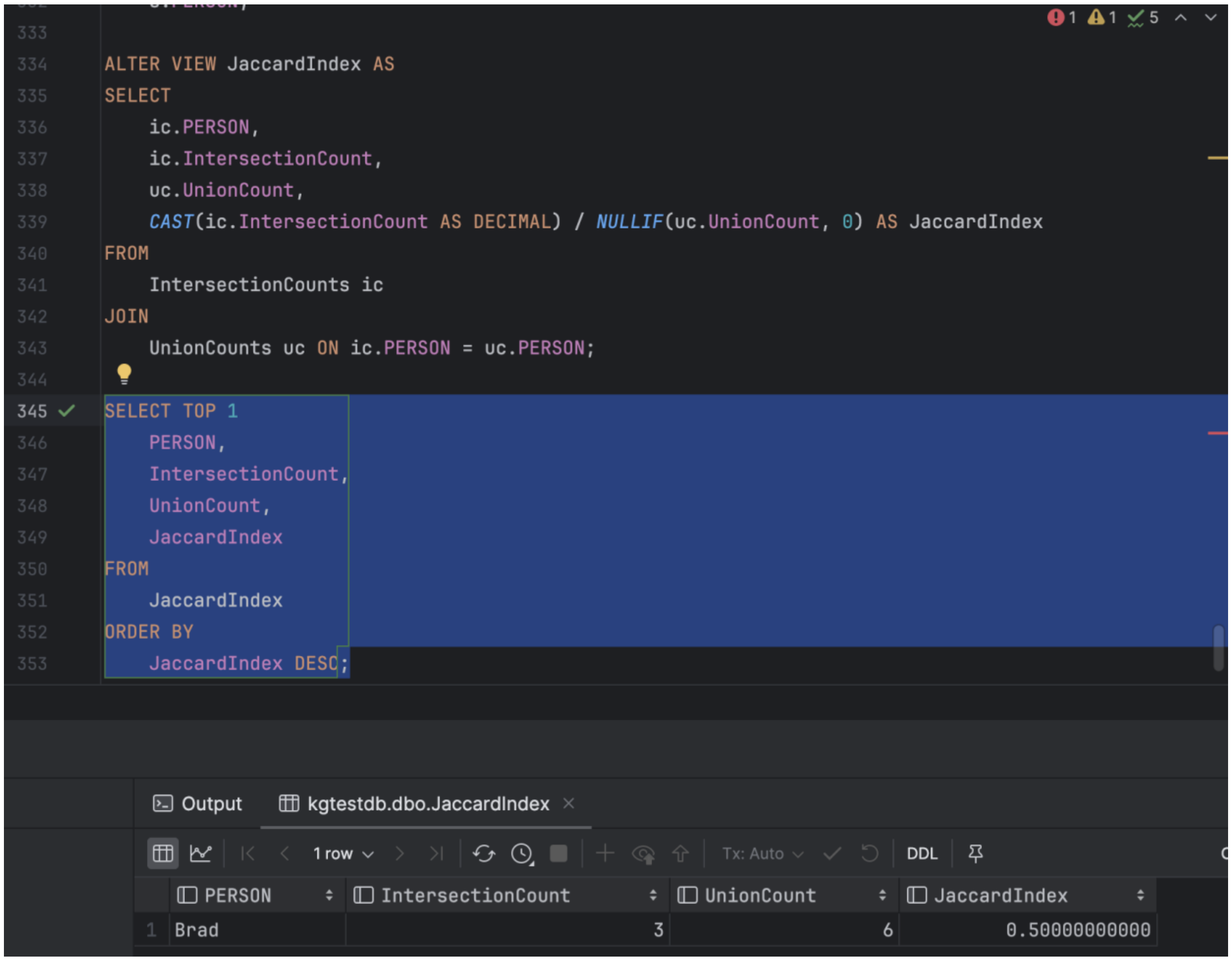
12. Whose set of flower sightings is most similar to John's? The set similarity is here defined in terms of the Jaccard Index, where JI(A, B) for two sets A and B is (size of the intersection of A and B) /(size of the union of A and B). A larger Jaccard Index means more similarities.

SQL Query:

```
CREATE VIEW JohnFlowers AS
SELECT DISTINCT NAME
FROM SIGHTINGS
WHERE PERSON = 'John';

CREATE VIEW IntersectionCounts AS
SELECT
    s.PERSON,
    COUNT(DISTINCT s.NAME) AS IntersectionCount
FROM
    SIGHTINGS s
JOIN
    JohnFlowers jf ON s.NAME = jf.NAME
WHERE
    s.PERSON <> 'John'
GROUP BY
    s.PERSON;

CREATE VIEW UnionCounts AS
SELECT
    s.PERSON,
    COUNT(DISTINCT s.NAME) + ISNULL(COUNT(DISTINCT jf.NAME), 0) AS UnionCount
FROM
    SIGHTINGS s
LEFT JOIN
    JohnFlowers jf ON s.NAME = jf.NAME
WHERE
    s.PERSON <> 'John'
GROUP BY
    s.PERSON;

CREATE VIEW JaccardIndex AS
SELECT
    ic.PERSON,
    ic.IntersectionCount,
    uc.UnionCount,
    CAST(ic.IntersectionCount AS DECIMAL) / NULLIF(uc.UnionCount, 0) AS
JaccardIndex
FROM
    IntersectionCounts ic
JOIN
    UnionCounts uc ON ic.PERSON = uc.PERSON;

SELECT TOP 1
```

```sql
    PERSON,
    IntersectionCount,
    UnionCount,
    JaccardIndex
FROM
    JaccardIndex
ORDER BY
    JaccardIndex DESC;
```

Executed Picture:



```sql
ALTER VIEW JaccardIndex AS
SELECT
    ic.PERSON,
    ic.IntersectionCount,
    uc.UnionCount,
    CAST(ic.IntersectionCount AS DECIMAL) / NULLIF(uc.UnionCount, 0) AS JaccardIndex
FROM
    IntersectionCounts ic
JOIN
    UnionCounts uc ON ic.PERSON = uc.PERSON;

SELECT TOP 1
    PERSON,
    IntersectionCount,
    UnionCount,
    JaccardIndex
FROM
    JaccardIndex
ORDER BY
    JaccardIndex DESC;
```

	PERSON	IntersectionCount	UnionCount	JaccardIndex
1	Brad	3	6	0.50000000000

Solution:
Brad,3,6,0.50000000000