Directions: Write SQL statements for the following queries related to the Seattle Flights database. Do **NOT** actually list the results, **ONLY** the SQL statement that would produce the correct results.

1. Find the length of all tail numbers.

   Solution:

```
SELECT
    LENGTH(tailnum)
FROM
    Flights;
```

2. What is the minimum length of the tail numbers? Make sure to eliminate the null and/or zero length entries.

   Solution:

```
SELECT
    MIN(LENGTH(tailnum))
FROM
    Flights
WHERE
    NOT ISNULL(tailnum)
        AND LENGTH(tailnum) > 0;
```

3. Using string functions, SELECT the first, third, and last character FROM each plane's tail number, and "store" into one result named 'Abbrev. Tail'.

   Solution:

```
SELECT
    CONCAT(LEFT(tailnum, 1),
            SUBSTRING(tailnum, 3, 1),
            RIGHT(tailnum, 1)) AS 'Abbrev. Tail'
FROM
    Flights;
```

4. Which destination had the most flights in 2014?

   Solution:

```
SELECT
    dest AS City, COUNT(dest) AS numflights
FROM
    Flights
```

```
GROUP BY dest
ORDER BY numflights DESC
LIMIT 1;
```

5. How many (unique) planes flew out of Seattle in 2014?

   Solution:

```
SELECT
    COUNT(DISTINCT (tailnum))
FROM
    Flights
WHERE
    NOT ISNULL(tailnum);
```

6. What is the shortest flight in terms of time? distance?

   Solution:

```
SELECT
    flight, MIN(air_time) AS Time
FROM
    Flights
WHERE
    air_time > 0
GROUP BY flight
ORDER BY Time
LIMIT 1;
```

7. Which plane has flown the most flights out of Seattle? To which destination?

   Solution:

```
SELECT
    tailnum, dest, COUNT(tailnum) AS X
FROM
    Flights
WHERE
    tailnum <> ''
GROUP BY tailnum , dest
ORDER BY X DESC
LIMIT 1;
```

8. Find the average flight time of all United Airlines `UA` flights to `DEN` by month.

   Solution:

```
SELECT
    ROUND(AVG(air_time), 0)
FROM
    Flights
```

```
WHERE
    carrier = 'UA' AND dest = 'DEN';
```

9. Determine the number of flights FROM Seattle to Los Angeles on July 4, 2014.

   Solution:

```
SELECT
    COUNT(fid)
FROM
    Flights
WHERE
    dest = 'LAX' AND month = 7 AND day = 4;
```

10. Determine the total mileage American Airlines flew each month. Include a count the number of flights American Airlines flew each month.

    Solution:

```
SELECT
    month, SUM(distance), COUNT(fid)
FROM
    Flights
WHERE
    carrier = 'AA'
GROUP BY month;
```

11. What is the maximum flight time of all flights to `DFW`?

    Solution:

```
SELECT
    MAX(air_time) AS FlightTime
FROM
    Flights
WHERE
    dest = 'DFW';
```

12. Delays are estimated to cost the airlines several billion dollars in additional expense[1]. Delays also drive demand for extra gates and ground personnel. Furthermore, delays cost customers in the form of lost productivity and wages. In 2018, the cost to airlines and customers was estimated to be $28 billion.

    Find the total delay of all flights (sum of departure and arrival delays).

    Solution:

[1] Fuel and salaries are the most significant expenses for airlines.

```
SELECT
    SUM(dep_delay), SUM(arr_delay), SUM(dep_delay + arr_delay)
FROM
    Flights
WHERE
    dep_delay > 0 AND arr_delay > 0;
```

13. List the number of delayed flights by carrier and destination.

    Solution:

```
SELECT
    carrier, dest, COUNT(fid)
FROM
    Flights
WHERE
    dep_delay > 0
GROUP BY carrier , dest;
```

14. Find the average departure delay of American Airlines flights to `DFW`.

    Solution:

```
SELECT
    AVG(dep_delay)
FROM
    Flights
WHERE
    dest = 'DFW' AND carrier = 'AA'
        AND dep_delay > 0;
```

15. Which airline had the most (departure) delayed flights? Hint: use `WHERE, GROUP BY, ORDER BY`, and `LIMIT` clauses.

    Solution:

```
SELECT
    carrier
FROM
    (SELECT
        carrier, COUNT(fid) AS 'Delays'
    FROM
        Flights
    WHERE
        dep_delay > 0
    GROUP BY carrier
    ORDER BY Delays DESC
    LIMIT 1) AS X;
```

16. What is the average departure delay of American Airlines `AA`?

Solution:

```
SELECT
    AVG(dep_delay)
FROM
    Flights
WHERE
    carrier = 'AA' AND dep_delay > 0;
```

17. Find the average flight time of United Airlines `UA` flights by destination. Round time up to next minute. Sort by destination in ascending order. Modify this to only destinations starting with the letter 'I'.

    Solution:

```
SELECT
    dest, CEIL(AVG(air_time)) AS 'Avg. Time'
FROM
    Flights
WHERE
    carrier = 'UA'
GROUP BY dest
ORDER BY dest;


SELECT
    carrier, dest, CEIL(AVG(air_time)) AS 'Avg. Time'
FROM
    Flights
WHERE
    carrier = 'UA'
GROUP BY dest
HAVING dest LIKE 'I%'
ORDER BY dest;
```

18. List all store products made in the USA.

    Solution:

```
SELECT
    product_id, country
FROM
    Products
WHERE
    country IN ('USA' , 'US');
```

19. Find the average price and MSRP of all products in the store database. Additionally, find the ratio of these averages to identify the average (in some sense) mark-up. Round answers to cents.

    Solution:

```sql
SELECT
    ROUND(AVG(MSRP), 2),
    ROUND(AVG(price), 2),
    ROUND(AVG(MSRP) / AVG(price), 0)
FROM
    Products;
```

20. Calculate the total sale price on all bird products made in China. Total price also includes 8% sales tax and shipping amount. Calculate the shipping cost using the formula:

$$\$3.50 \times \text{Volume}/166.$$

Then round up to the nearest $0.99. That is, make all prices $x.99, WHERE x is the calculated dollar amount that includes tax and shipping. For example, if your calculated price is $33.57, set the price to $33.99. Don't forget the seller's mark-up by using the MSRP.

Solution:

```sql
SELECT
    MSRP,
    CEIL(
    1.08 * MSRP + (ship_depth * ship_weight * ship_length / 166) * 3.5) - 0.01
        AS 'Final Price'
FROM
    Products
WHERE
    country = 'China'
        AND (description LIKE '%bird%'
        OR name LIKE '%bird%');
```
