1.

    a. "char" stores characters of a fixed length, and it will pad spaces to meet the limit, while "varchar" allows variable-length characters, it will not pad spaces.

    b. MySQL treats "boolean" as a TINYINT(1).

    c. TINYINT takes 1 btye, signed range is from -128 to 127 while unsigned is from 0 to 255. SMALLINT takes 2 bytes, signed range is from -32768 to 32767, unsigned range is from 0 to 65535. MEDIUMINT takes 3 bytes, signed range is from -8388608 to 8388607, unsigned range is from 0 to 16777215. INT takes 4 bytes, signed range is from -2147483648 to 2147483647, unsigned range is from 0 to 4294967295.

2. -

3. Tasks

我的虛擬機在寫作業寫到一半的時候死掉了，所以有一半是用WSL做的，黑色terminal是WSL，紫色terminal是虛擬機

A. Create Tables

```
mysql> describe customers;
+-------------------------+-------------+------+-----+---------+-------+
| Field                   | Type        | Null | Key | Default | Extra |
+-------------------------+-------------+------+-----+---------+-------+
| customer_id             | varchar(50) | NO   | PRI | NULL    |       |
| customer_unique_id      | varchar(50) | YES  |     | NULL    |       |
| customer_zip_code_prefix| int         | YES  |     | 0       |       |
| customer_city           | varchar(50) | YES  |     | NULL    |       |
| customer_state          | varchar(50) | YES  |     | NULL    |       |
+-------------------------+-------------+------+-----+---------+-------+
5 rows in set (0.01 sec)
```

```
mysql> describe geolocation;
+---------------------------+-------------+------+-----+---------+-------+
| Field                     | Type        | Null | Key | Default | Extra |
+---------------------------+-------------+------+-----+---------+-------+
| geolocation_zip_code_prefix| varchar(50) | YES  |     | NULL    |       |
| geolocation_lat           | float       | NO   | PRI | NULL    |       |
| geolocation_lng           | float       | NO   | PRI | NULL    |       |
| geolocation_city          | varchar(50) | YES  |     | NULL    |       |
| geolocation_state         | varchar(50) | YES  |     | NULL    |       |
+---------------------------+-------------+------+-----+---------+-------+
5 rows in set (0.01 sec)
```

```
mysql> describe order_items;
+---------------------+-------------+------+-----+---------+-------+
| Field               | Type        | Null | Key | Default | Extra |
+---------------------+-------------+------+-----+---------+-------+
| order_id            | varchar(50) | NO   | PRI | NULL    |       |
| order_item_id       | int         | NO   | PRI | 0       |       |
| product_id          | varchar(50) | YES  |     | NULL    |       |
| seller_id           | varchar(50) | YES  |     | NULL    |       |
| shipping_limit_date | datetime    | YES  |     | NULL    |       |
| price               | float       | YES  |     | NULL    |       |
| freight_value       | float       | YES  |     | NULL    |       |
+---------------------+-------------+------+-----+---------+-------+
7 rows in set (0.01 sec)
```

```
mysql> describe orders;
+------------------------------+-------------+------+-----+---------+-------+
| Field                        | Type        | Null | Key | Default | Extra |
+------------------------------+-------------+------+-----+---------+-------+
| order_id                     | varchar(50) | NO   | PRI | NULL    |       |
| customer_id                  | varchar(50) | YES  |     | NULL    |       |
| order_status                 | varchar(50) | YES  |     | NULL    |       |
| order_purchase_timestamp     | datetime    | YES  |     | NULL    |       |
| order_approved_at            | datetime    | YES  |     | NULL    |       |
| order_delivered_carrier_date | datetime    | YES  |     | NULL    |       |
| order_delivered_customer_date| datetime    | YES  |     | NULL    |       |
| order_estimated_delivery_date| datetime    | YES  |     | NULL    |       |
+------------------------------+-------------+------+-----+---------+-------+
8 rows in set (0.00 sec)
```

```
mysql> describe payments;
+----------------------+-------------+------+-----+---------+-------+
| Field                | Type        | Null | Key | Default | Extra |
+----------------------+-------------+------+-----+---------+-------+
| order_id             | varchar(50) | NO   | PRI | NULL    |       |
| payment_sequential   | int         | YES  |     | 0       |       |
| payment_type         | varchar(50) | YES  |     | NULL    |       |
| payment_installments | int         | YES  |     | 0       |       |
| payment_value        | float       | YES  |     | NULL    |       |
+----------------------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

```
mysql> describe products;
+------------------------------+-------------+------+-----+---------+-------+
| Field                        | Type        | Null | Key | Default | Extra |
+------------------------------+-------------+------+-----+---------+-------+
| product_id                   | varchar(50) | NO   | PRI | NULL    |       |
| product_category             | varchar(50) | YES  |     | NULL    |       |
| product_name_length          | int         | YES  |     | 0       |       |
| production_description_length | int        | YES  |     | 0       |       |
| product_photos_qty           | int         | YES  |     | 0       |       |
| product_weight_g             | int         | YES  |     | 0       |       |
| product_length_cm            | int         | YES  |     | 0       |       |
| product_height_cm            | int         | YES  |     | 0       |       |
| product_width_cm             | int         | YES  |     | 0       |       |
+------------------------------+-------------+------+-----+---------+-------+
9 rows in set (0.00 sec)
```

```
mysql> describe sellers;
+-----------------------+-------------+------+-----+---------+-------+
| Field                 | Type        | Null | Key | Default | Extra |
+-----------------------+-------------+------+-----+---------+-------+
| seller_id             | varchar(50) | NO   | PRI | NULL    |       |
| seller_zip_code_prefix | int        | YES  |     | 0       |       |
| seller_city           | varchar(50) | YES  |     | NULL    |       |
| seller_state          | varchar(50) | YES  |     | NULL    |       |
+-----------------------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

B. Query Tasks

1. (WSL)

```
1    select count(distinct customer_unique_id) as cnt
2    from customers
```

```
mysql> source 1.sql;
+-------+
| cnt   |
+-------+
| 96096 |
+-------+
1 row in set (0.64 sec)
```

2. (虛擬機)

```
1    select count(distinct customer_unique_id) as cnt
2    from customers
3    where customer_unique_id
```

```
mysql> source 2.sql;
+-----+
| cnt |
+-----+
|  37 |
+-----+
1 row in set (0.03 sec)
```

3. (虛擬機)

```
1    select customer_city as city
2    from customers
3    where customer_state like 'RJ'
4    group by customer_city
5    order by count(customer_city) desc
6    limit 3;
```

```
mysql> source 3.sql;
+----------------+
| city           |
+----------------+
| rio de janeiro |
| niteroi        |
| nova iguacu    |
+----------------+
3 rows in set (0.04 sec)
```

4. (虛擬機)

```
1    -- order_delivered_customer_date - carrier
2    select order_id
3    from orders
4    order by (order_delivered_customer_date - order_delivered_carrier_date) desc
5    limit 3;
```

```
mysql> source 4.sql;
+----------------------------------+
| order_id                         |
+----------------------------------+
| 2aa91108853cecb43c84a5dc5b277475 |
| 6e6527028de694ccade37f5a15a6d84a |
| ed8e9faf1b75f43ee027103957135663 |
+----------------------------------+
3 rows in set (0.05 sec)
```

5. (虛擬機)

```sql
select c.customer_state as state, count(c.customer_state) as cnt
from customers as c
inner join (
    select o.customer_id
    from orders as o
    where o.order_status != 'delivered') as id
on c.customer_id = id.customer_id
group by c.customer_state;
```

```
mysql> source 5.sql;
+-------+------+
| state | cnt  |
+-------+------+
| SP    | 1245 |
| BA    |  124 |
| MG    |  281 |
| SC    |   91 |
| RJ    |  502 |
| RS    |  121 |
| CE    |   57 |
| MA    |   30 |
| PR    |  122 |
| PE    |   59 |
| DF    |   60 |
| PB    |   19 |
| PI    |   19 |
| MT    |   21 |
| GO    |   63 |
| SE    |   15 |
| ES    |   38 |
| PA    |   29 |
| MS    |   14 |
| AM    |    3 |
| AP    |    1 |
| RN    |   11 |
| TO    |    6 |
| RO    |   10 |
| AL    |   16 |
| RR    |    5 |
| AC    |    1 |
+-------+------+
27 rows in set (0.05 sec)
```

6. (WSL)

```sql
select order_id
from orders
except
select order_id
from payments;
```

```
mysql> source 6.sql;
+----------------------------------------+
| order_id                               |
+----------------------------------------+
| bfbd0f9bdef84302105ad712db648a6c       |
+----------------------------------------+
1 row in set (0.91 sec)
```

7.

8. (WSL)

```
 1    select count(p.order_id) as cnt
 2    from payments as p
 3    where p.order_id in(
 4        select o.order_id
 5        from orders as o
 6        where year(order_purchase_timestamp) = 2017 and o.customer_id in(
 7            select customer_id
 8            from customers
 9            where customer_state = 'RJ'
10        )
11    )
```

```
mysql> source 8.sql;
+-------+
| cnt   |
+-------+
| 6225  |
+-------+
1 row in set (0.37 sec)
```

9.

```
 1    select pr.seller_id, count(*) as cnt
 2    from(
 3        select o.seller_id
 4        from order_items as o
 5        where o.price > 150
 6    ) as pr
 7    group by pr.seller_id
 8    having count(*) > 100
 9    order by count(*) desc
10    limit 3;
```

```
mysql> source 9.sql
+----------------------------------+-----+
| seller_id                        | cnt |
+----------------------------------+-----+
| 4869f7a5dfa277a7dca6462dcf3b52b2 | 780 |
| 7c67e1448b00f6e969d365cea6b010ab | 487 |
| fa1c13f2614d7b5c4749cbc52fecda94 | 476 |
+----------------------------------+-----+
3 rows in set (0.10 sec)
```

10. (WSL)

```
 1    select p.payment_type, count(p.order_id) as cnt
 2    from payments as p
 3    group by p.payment_type
 4    having count(*) > 100
 5  ∨ except(
 6        select pa.payment_type, count(pa.order_id)
 7        from payments as pa
 8        group by pa.payment_type
 9        order by count(*) desc
10        limit 2
11    );
```

```
mysql> source 10.sql
+--------------+------+
| payment_type | cnt  |
+--------------+------+
| voucher      | 2739 |
| debit_card   | 1527 |
+--------------+------+
2 rows in set (0.49 sec)
```