

In the SQL editor, enter the following query:

-- Perform basic data cleaning

-- Drop any rows with missing values.

```
DELETE FROM climate
```

```
WHERE column_0 IS NULL OR area IS NULL OR item IS NULL  
OR year IS NULL OR average_rain_fall_mm_per_year IS NULL  
OR pesticides_tonnes IS NULL OR avg_temp IS NULL OR  
hg_ha_yield IS NULL;
```

-- Convert all of the columns to numeric values.

```
ALTER TABLE climate
```

```
ALTER COLUMN column_0 SET DATA TYPE DECIMAL(10,2);
```

```
ALTER TABLE climate
```

```
ALTER COLUMN average_rain_fall_mm_per_year SET DATA  
TYPE DECIMAL(10,2);
```

```
ALTER TABLE climate
```

```
ALTER COLUMN pesticides_tonnes SET DATA TYPE  
DECIMAL(10,2);
```

```
ALTER TABLE climate
```

```
ALTER COLUMN avg_temp SET DATA TYPE DECIMAL(10,2);
```

-- Perform basic data transformation

-- Calculate the average pesticide use for each crop.

```
SELECT item, AVG(pesticides_tonnes) AS  
average_pesticide_use  
FROM climate  
GROUP BY item;
```

-- Identify the crops with the highest and lowest average yields.

```
SELECT item, AVG(hg_ha_yield) AS average_yield From  
climate GROUP BY item ORDER BY average_yield DESC LIMIT  
10;
```

```
SELECT item, AVG(hg_ha_yield) AS average_yield FROM  
climate GROUP BY item ORDER BY average_yield  
ASCLIMIT 10;
```

-- Calculate the trend in average temperature over time.

```
SELECT year, AVG(avg_temp) AS average_temperature  
FROM climate GROUP BY year ORDER BY year;
```

-- Calculate the correlation between pesticide use and average yield.

```
SELECT CORR(pesticides_tonnes, hg_ha_yield) AS  
correlation_coefficient from climate;
```

-- Identify the crops that are most and least sensitive to changes in pesticide use.

Calculate the percentage change in average yield for each crop for every 10% increase in pesticide use

```
delta_yield = (hg_ha_yield - LAG(hg_ha_yield, 1) OVER  
(PARTITION BY item ORDER BY year)) / LAG(hg_ha_yield, 1)  
OVER (PARTITION BY item ORDER BY year) * 100;
```

Calculate the average percentage change in yield for each crop

```
average_delta_yield = delta_yield.groupby('item').mean();
```

Sort the crops by average percentage change in yield

```
average_delta_yield.sort_values(ascending=False,  
inplace=True);
```

Print the crops that are most and least sensitive to changes in pesticide use

```
print('Crops that are most sensitive to changes in pesticide  
use:')
```

```
print(average_delta_yield.head(10))
```

```
print('Crops that are least sensitive to changes in pesticide  
use:')
```

```
print(average_delta_yield.tail(10))
```

```
SELECT item, AVG(delta_yield) AS average_delta_yieldFROM  
(SELECT item, (hg_ha_yield - LAG(hg_ha_yield, 1) OVER  
(PARTITION BY item ORDER BY year)) / LAG(hg_ha_yield, 1)  
OVER (PARTITION BY item ORDER BY year) * 100 AS  
delta_yield FROM climate) AS delta_yield_table  
GROUP BY item ORDER BY average_delta_yield DESC  
LIMIT 10;
```

```
SELECT item, AVG(delta_yield) AS average_delta_yield  
FROM ( SELECT item,(hg_ha_yield - LAG(hg_ha_yield, 1)  
OVER (PARTITION BY item ORDER BY year)) /  
LAG(hg_ha_yield, 1) OVER (PARTITION BY item ORDER BY  
year) * 100 AS delta_yield  
FROM climate) AS delta_yield_table  
GROUP BY item ORDER BY average_delta_yield ASC  
LIMIT 10;
```