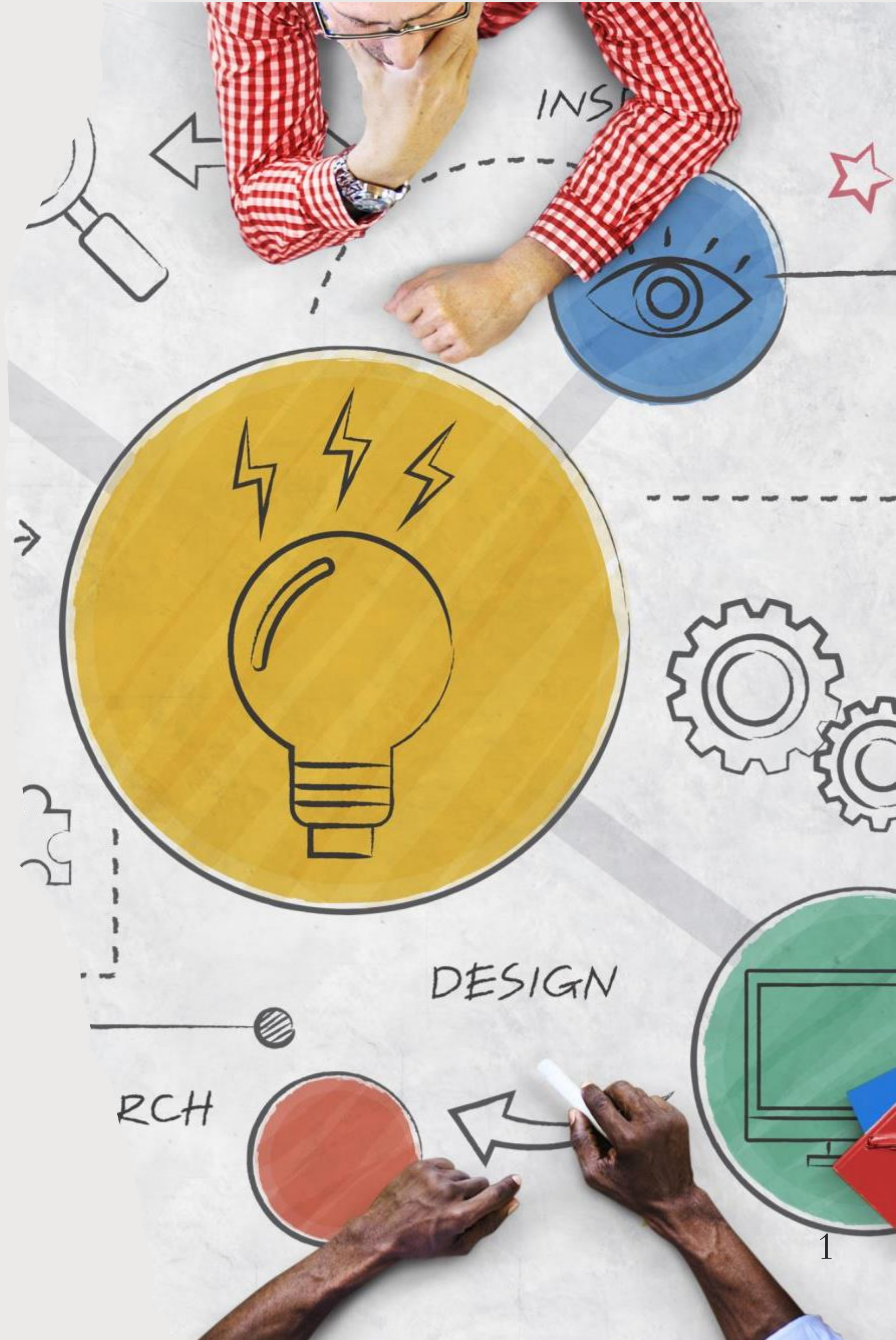
ACTIONS & BASIC TRANSFORMATIONS



CONTENT

GOAL OF THE LEARNING SECTIONS

- Import Data
- Perform Basic Transformation
- Perform Conditional Selection of Rows
- Carry out basic Data Cleaning

IMPORTING DATA

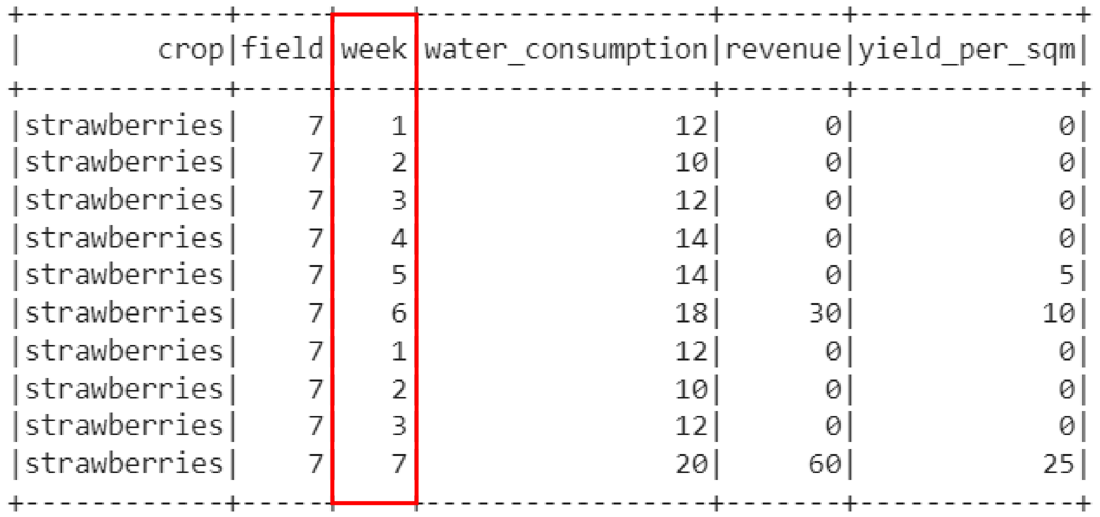
- Importing Data with .spark.read.options()

```
df_fru = spark.read.options(header='True',
                            multiline='True',
                            inferSchema='True')
                            .csv('Fruits.csv')
```

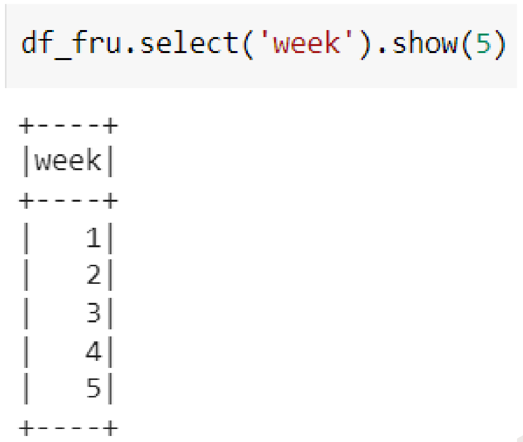
```
df_veg = spark.read.option("multiline",True).json('Vegetables.json')
```

ACCESSING COLUMNS

- Accessing columns with .select()



```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   4|               14|      0|            0|
|strawberries|    7|   5|               14|      0|            5|
|strawberries|    7|   6|               18|     30|           10|
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   7|               20|     60|           25|
+-----------+-----+----+-----------------+-------+-------------+
```



```
df_fru.select('week').show(5)
```

```
+----+
|week|
+----+
|   1|
|   2|
|   3|
|   4|
|   5|
+----+
```

ACCESSING ROWS

- Accessing columns with workaround .collect() then access with print()

(and square brackets-operator for row)

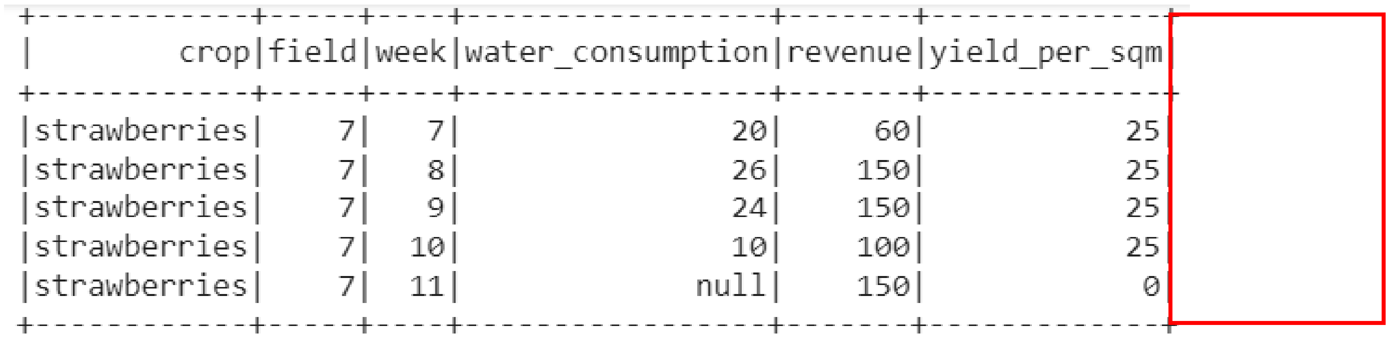
```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   4|               14|      0|            0|
|strawberries|    7|   5|               14|      0|            5|
|strawberries|    7|   6|               18|     30|           10|
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   7|               20|     60|           25|
+-----------+-----+----+-----------------+-------+-------------+
```

```python
df_fru_lokal = df_fru.collect()
print(f"Type of entries: {type(df_fru_lokal[0])}\n")
print(f"Entries: {df_fru_lokal[2]}")
```

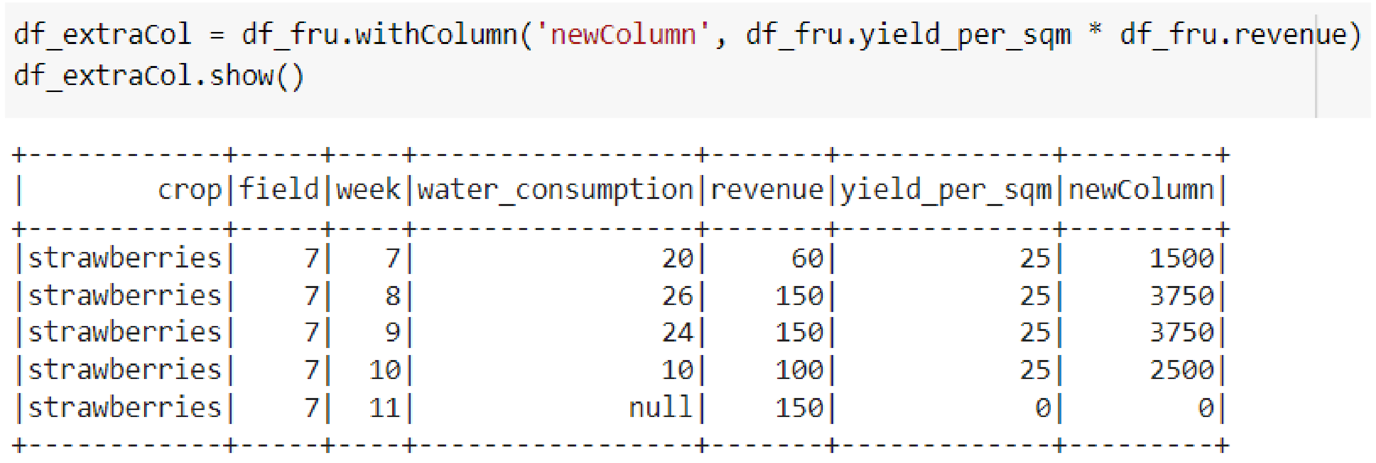
```
Type of entries: <class 'pyspark.sql.types.Row'>

Entries: Row(crop='strawberries', field=7, week=3, water_consumption=12, revenue=0, yield_per_sqm=0)
```

ADDING COLUMNS

- Adding columns with .withColumn()



```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   7|               20|     60|           25|
|strawberries|    7|   8|               26|    150|           25|
|strawberries|    7|   9|               24|    150|           25|
|strawberries|    7|  10|               10|    100|           25|
|strawberries|    7|  11|             null|    150|            0|
+-----------+-----+----+-----------------+-------+-------------+
```

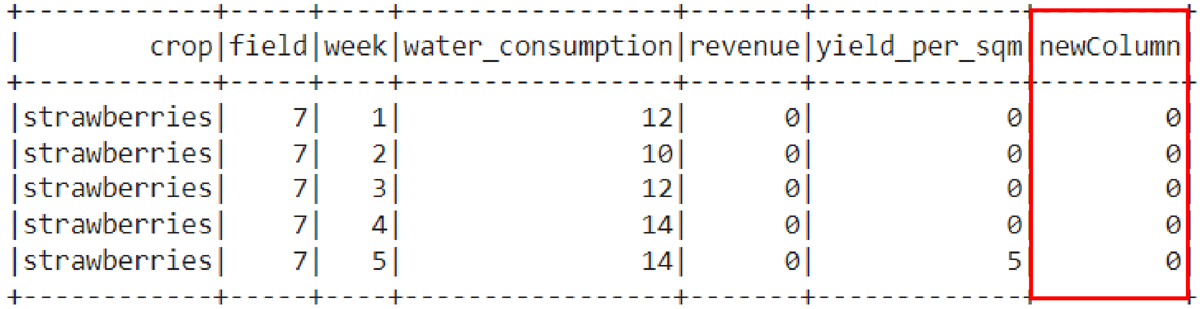


```python
df_extraCol = df_fru.withColumn('newColumn', df_fru.yield_per_sqm * df_fru.revenue)
df_extraCol.show()
```

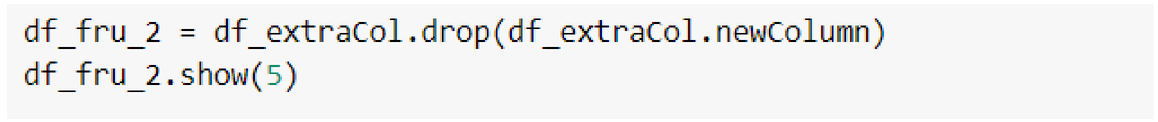
```
+-----------+-----+----+-----------------+-------+-------------+---------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|newColumn|
+-----------+-----+----+-----------------+-------+-------------+---------+
|strawberries|    7|   7|               20|     60|           25|     1500|
|strawberries|    7|   8|               26|    150|           25|     3750|
|strawberries|    7|   9|               24|    150|           25|     3750|
|strawberries|    7|  10|               10|    100|           25|     2500|
|strawberries|    7|  11|             null|    150|            0|        0|
+-----------+-----+----+-----------------+-------+-------------+---------+
```

REMOVING COLUMNS

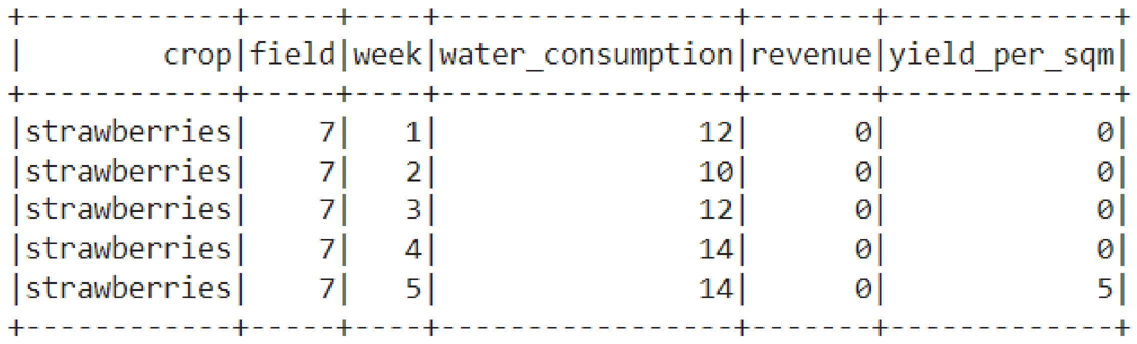
- Removing columns with .drop()



```
+-----------+-----+----+-----------------+-------+-------------+---------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|newColumn|
+-----------+-----+----+-----------------+-------+-------------+---------+
|strawberries|    7|   1|               12|      0|            0|        0|
|strawberries|    7|   2|               10|      0|            0|        0|
|strawberries|    7|   3|               12|      0|            0|        0|
|strawberries|    7|   4|               14|      0|            0|        0|
|strawberries|    7|   5|               14|      0|            5|        0|
+-----------+-----+----+-----------------+-------+-------------+---------+
```



```
df_fru_2 = df_extraCol.drop(df_extraCol.newColumn)
df_fru_2.show(5)
```



```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   4|               14|      0|            0|
|strawberries|    7|   5|               14|      0|            5|
+-----------+-----+----+-----------------+-------+-------------+
```

BASIC DATA CLEANING

- Removing NAs with .dropna()
- Removing duplicates with .dropDuplicates()

```
+----+-----------+-----------------+-----+-------+-------------+
|week|       crop|water_consumption|field|revenue|yield_per_sqm|
+----+-----------+-----------------+-----+-------+-------------+
|   1|strawberries|               12|    7|      0|            0|
|   1|strawberries|               12|    7|      0|            0|
|   2|strawberries|               10|    7|      0|            0|
|   2|strawberries|               10|    7|      0|            0|
|   3|strawberries|               12|    7|      0|            0|
|   3|strawberries|               12|    7|      0|            0|
|   4|strawberries|               14|    7|      0|            0|
|   5|strawberries|               14|    7|      0|            5|
|   6|strawberries|               18|    7|     30|           10|
|   7|strawberries|               20|    7|     60|           25|
|   8|strawberries|               26|    7|    150|           25|
|   9|strawberries|               24|    7|    150|           25|
|  10|strawberries|               10|    7|    100|           25|
|  11|strawberries|             null|    7|    150|            0|
+----+-----------+-----------------+-----+-------+-------------+
```

```
(df_fru.select('water_consumption')
       .dropna()
       .dropDuplicates()
       .show())
```

```
+-----------------+
|water_consumption|
+-----------------+
|               26|
|               12|
|               20|
|               10|
|               24|
|               14|
|               18|
+-----------------+
```

CONCATENATING DATAFRAMES

- Concatenating dataframes with .union()

```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   4|               14|      0|            0|
|strawberries|    7|   5|               14|      0|            5|
+-----------+-----+----+-----------------+-------+-------------+
```

```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   6|               18|     30|           10|
+-----------+-----+----+-----------------+-------+-------------+
```

```
df_fru1.union(df_fru2).show()
```

```
+-----------+-----+----+-----------------+-------+-------------+
|       crop|field|week|water_consumption|revenue|yield_per_sqm|
+-----------+-----+----+-----------------+-------+-------------+
|strawberries|    7|   1|               12|      0|            0|
|strawberries|    7|   2|               10|      0|            0|
|strawberries|    7|   3|               12|      0|            0|
|strawberries|    7|   4|               14|      0|            0|
|strawberries|    7|   5|               14|      0|            5|
|strawberries|    7|   6|               18|     30|           10|
+-----------+-----+----+-----------------+-------+-------------+
```

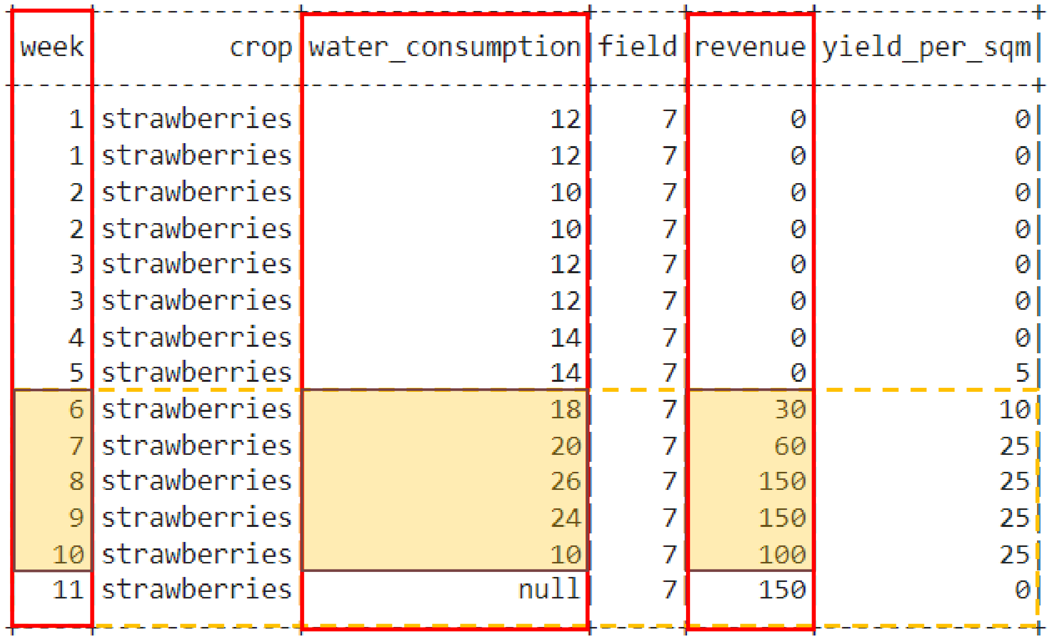
PERFORM CONDITIONAL SELECTION OF ROWS

- Combining aggregate functions, to achieve exact selection: .filter()

  .where()

  .withColumn()

  …



```
+----+-----------+-----------------+-----+-------+-------------+
|week|       crop|water_consumption|field|revenue|yield_per_sqm|
+----+-----------+-----------------+-----+-------+-------------+
|   1|strawberries|               12|    7|      0|            0|
|   1|strawberries|               12|    7|      0|            0|
|   2|strawberries|               10|    7|      0|            0|
|   2|strawberries|               10|    7|      0|            0|
|   3|strawberries|               12|    7|      0|            0|
|   3|strawberries|               12|    7|      0|            0|
|   4|strawberries|               14|    7|      0|            0|
|   5|strawberries|               14|    7|      0|            5|
|   6|strawberries|               18|    7|     30|           10|
|   7|strawberries|               20|    7|     60|           25|
|   8|strawberries|               26|    7|    150|           25|
|   9|strawberries|               24|    7|    150|           25|
|  10|strawberries|               10|    7|    100|           25|
|  11|strawberries|             null|    7|    150|            0|
+----+-----------+-----------------+-----+-------+-------------+
```

```
(df_fru.select('week', 'water_consumption', 'revenue')
       .filter(df_fru.week > 5)
       .dropna()
       .show())
```

```
+----+-----------------+-------+
|week|water_consumption|revenue|
+----+-----------------+-------+
|   6|               18|     30|
|   7|               20|     60|
|   8|               26|    150|
|   9|               24|    150|
|  10|               10|    100|
+----+-----------------+-------+
```

PERFORM CONDITIONAL SELECTION OF ROWS

```
(df_fru.select('*')
       .where((df_fru.revenue != 0) & (df_fru.week > 7))
       .withColumn('lucrativeness', df_fru.revenue * df_fru.yield_per_sqm)
       .dropna()
       .describe()
       .show())
```

```
+-------+------------+-----+----+-----------------+------------------+-------------+------------------+
|summary|        crop|field|week|water_consumption|           revenue|yield_per_sqm|     lucrativeness|
+-------+------------+-----+----+-----------------+------------------+-------------+------------------+
|  count|           3|    3|   3|                3|                 3|            3|                 3|
|   mean|        null|  7.0| 9.0|             20.0|133.33333333333334|         25.0|3333.3333333333335|
| stddev|        null|  0.0| 1.0|8.717797887081348|28.867513459481287|          0.0| 721.6878364870322|
|    min|strawberries|    7|   8|               10|               100|           25|              2500|
|    max|strawberries|    7|  10|               26|               150|           25|              3750|
+-------+------------+-----+----+-----------------+------------------+-------------+------------------+
```