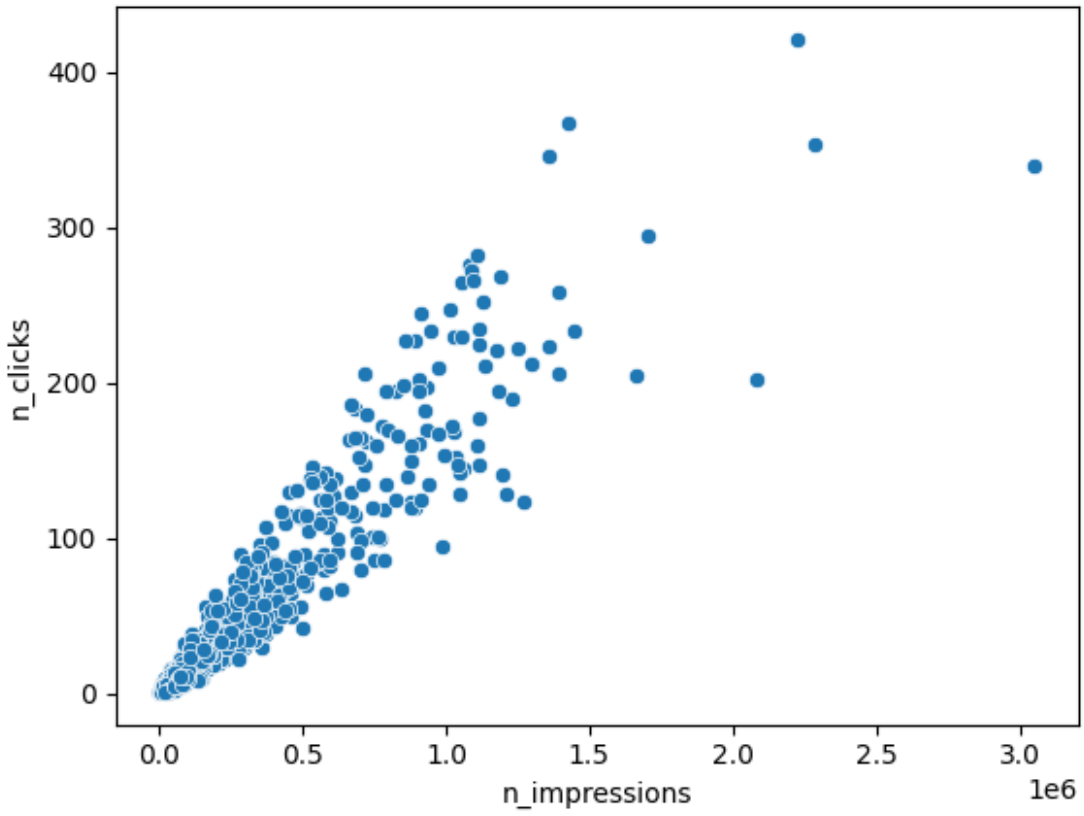
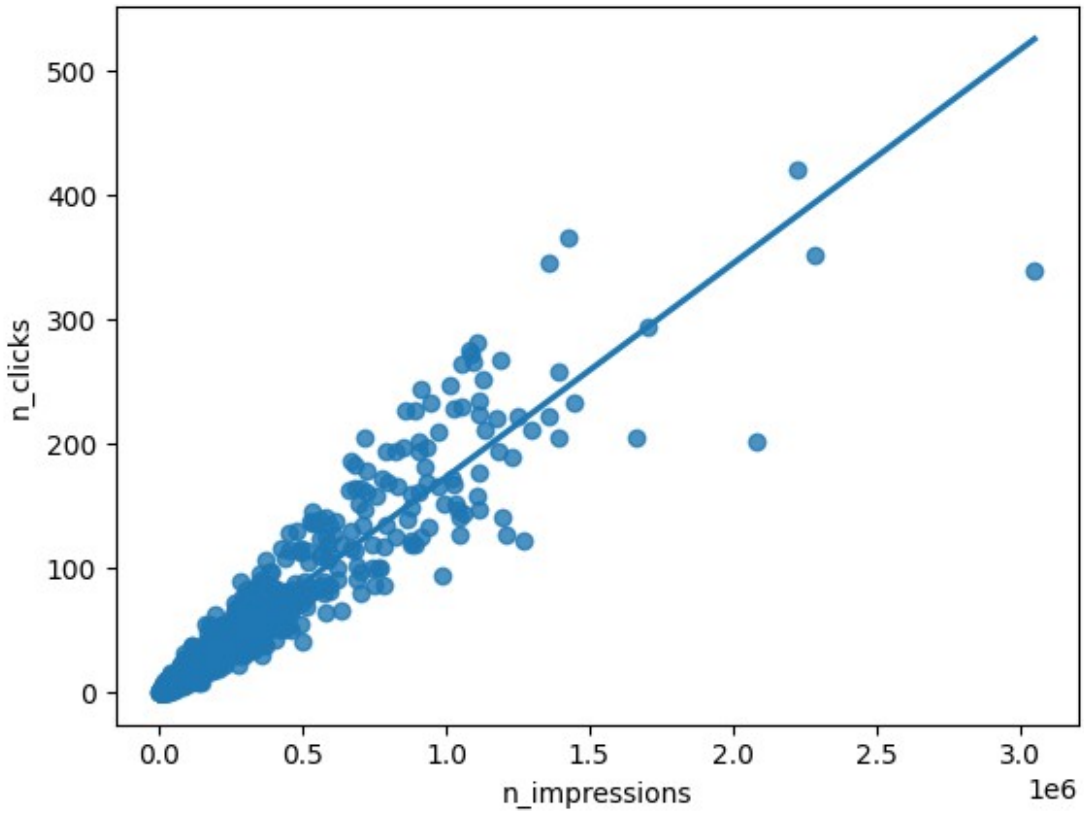
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.formula.api import ols

ad_conversion = pd.read_csv('ad_conversion.csv')
ad_conversion.head()
```

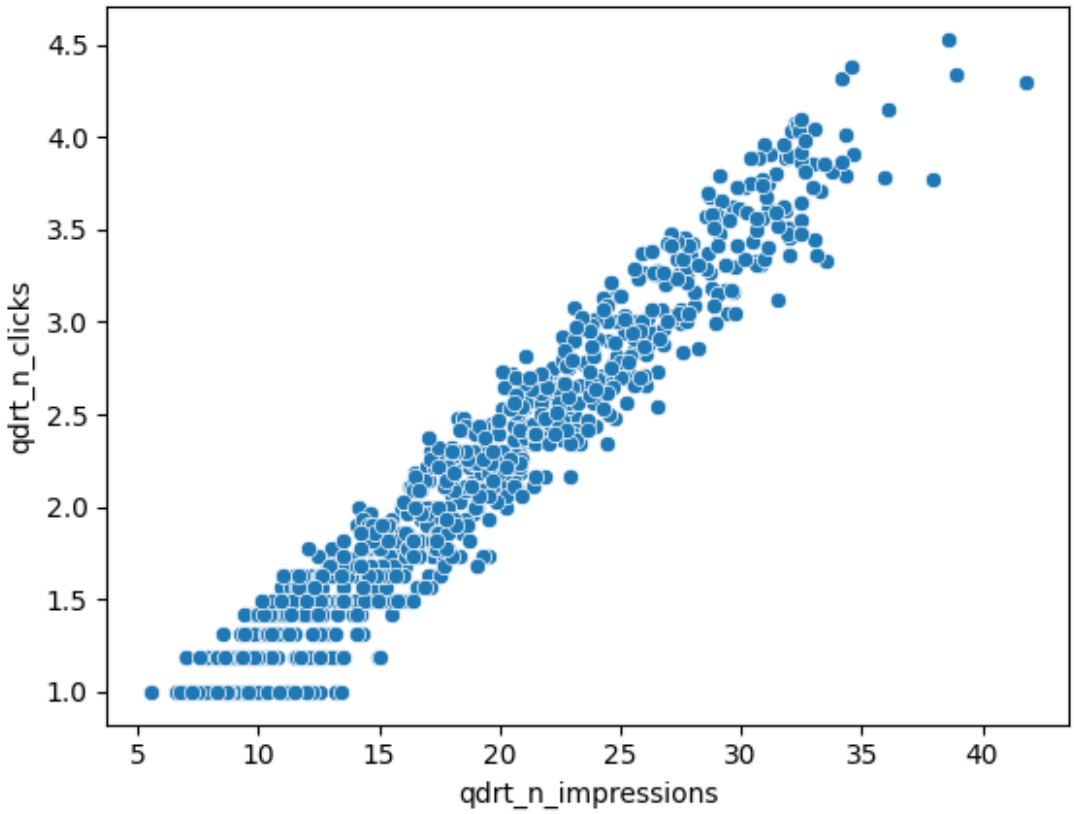
	spent_usd	n_impressions	n_clicks
0	1.43	7350	1
1	1.82	17861	2
2	1.25	4259	1
3	1.29	4133	1
4	4.77	15615	3

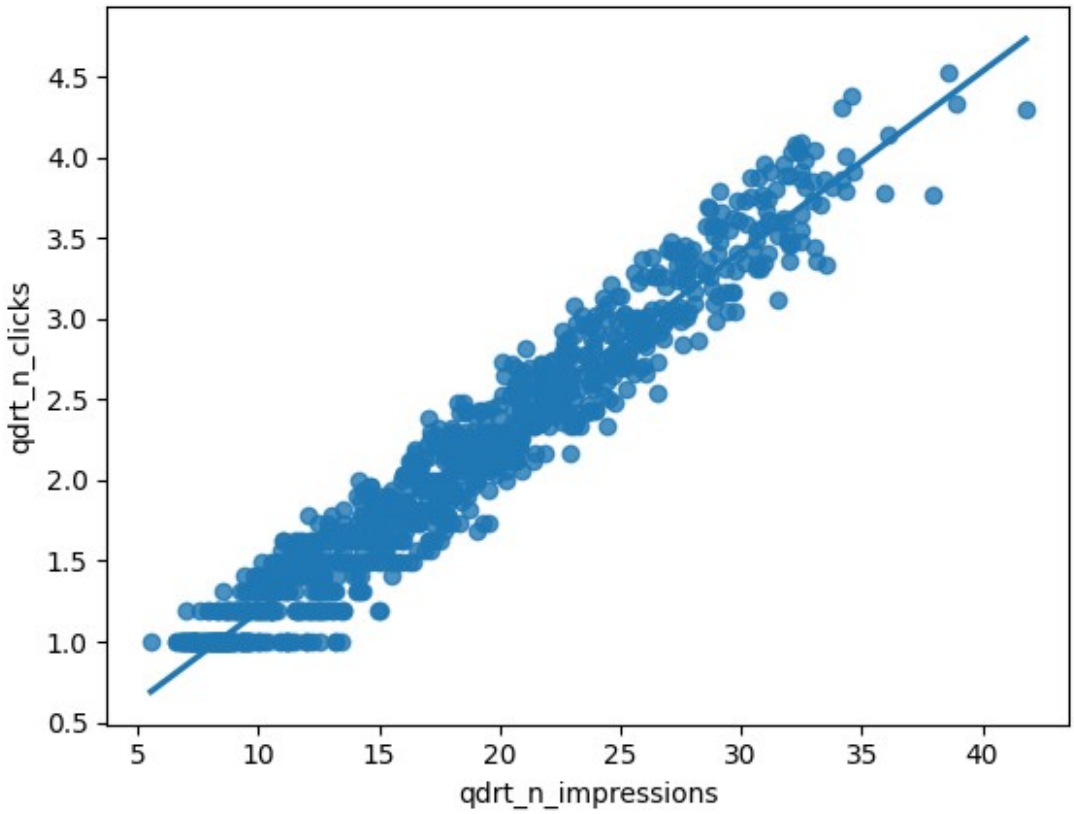
```
sns.scatterplot(x='n_impressions',y='n_clicks',data=ad_conversion)
plt.show()

sns.regplot(x='n_impressions',y='n_clicks',data=ad_conversion,ci=None)
plt.show()
```






```
ad_conversion['qdrt_n_impressions'] = ad_conversion['n_impressions']
** 0.25
ad_conversion['qdrt_n_clicks'] = ad_conversion['n_clicks'] ** 0.25

sns.scatterplot(x='qdrt_n_impressions',y='qdrt_n_clicks',data=ad_conve
rsion)
plt.show()

sns.regplot(x='qdrt_n_impressions',y='qdrt_n_clicks',data=ad_conversio
n,ci=None)
plt.show()
```


qdrt_n_clicks
qdrt_n_impressions
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
5
10
15
20
25
30
35
40


qdrt_n_clicks
qdrt_n_impressions
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
5
10
15
20
25
30
35
40

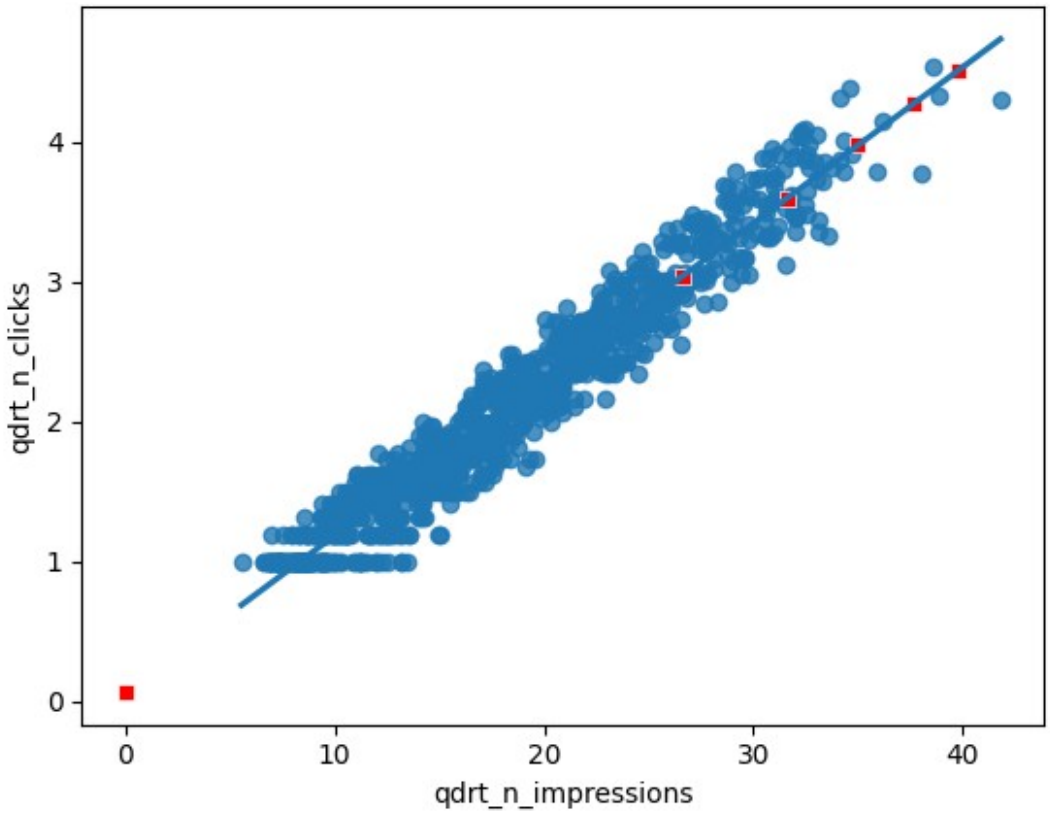
```
mdl_click_vs_impression = ols('qdrt_n_clicks ~
qdrt_n_impressions',data=ad_conversion).fit()
print(mdl_click_vs_impression.params)
```

```
Intercept              0.071748
qdrt_n_impressions     0.111533
dtype: float64
```

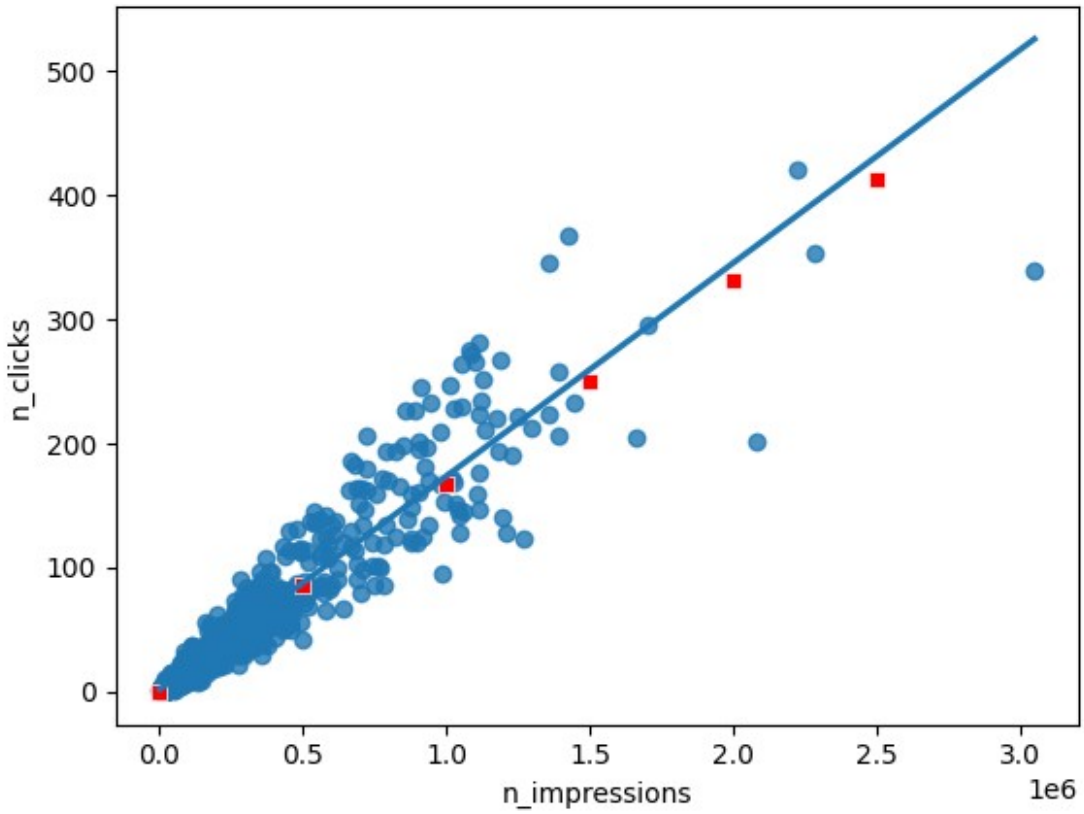
```
explanatory_data = pd.DataFrame(
    {
        "qdrt_n_impressions" : np.arange(0,3000000,500000) ** 0.25,
        "n_impressions" : np.arange(0,3000000,500000)
    }
)

prediction_data = explanatory_data.assign(
    qdrt_n_clicks = mdl_click_vs_impression.predict(explanatory_data)
)

print(prediction_data)
```

```
   qdrt_n_impressions  n_impressions  qdrt_n_clicks
0            0.000000              0       0.071748
1           26.591479         500000       3.037576
2           31.622777        1000000       3.598732
3           34.996355        1500000       3.974998
4           37.606031        2000000       4.266063
5           39.763536        2500000       4.506696
```

```
sns.regplot(x='qdrt_n_impressions',y="qdrt_n_clicks",data=ad_conversio
n,ci=None)
sns.scatterplot(x='qdrt_n_impressions',y='qdrt_n_clicks',data=predicti
on_data,color='red',marker='s')
plt.show()
```




```
prediction_data['n_clicks'] = prediction_data['qdrt_n_clicks'] ** 4


sns.regplot(x='n_impressions',y='n_clicks',data=ad_conversion,ci=None)
sns.scatterplot(x='n_impressions',y='n_clicks',data=prediction_data,co
lor='red',marker='s')
plt.show()
```




```
mse = mdl_click_vs_impression.mse_resid
print('mse: ',mse)

mse:  0.03877213389297149
```

Since MSE is 0.039 and it is closed to 0, we can determine that this model is a good fit.

```
rse = np.sqrt(mse)
print('rse: ',rse)

rse:  0.19690640896875725
```