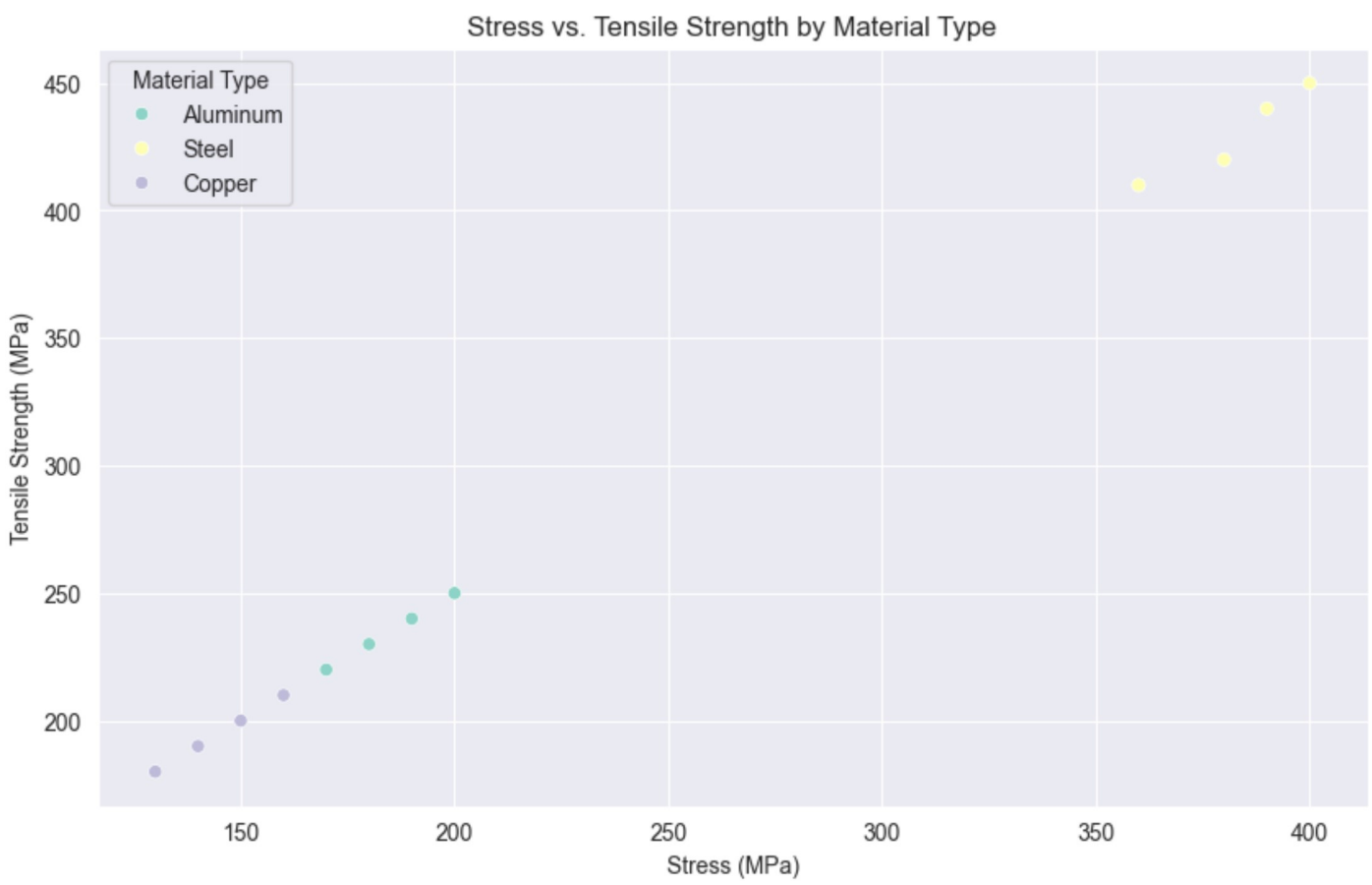
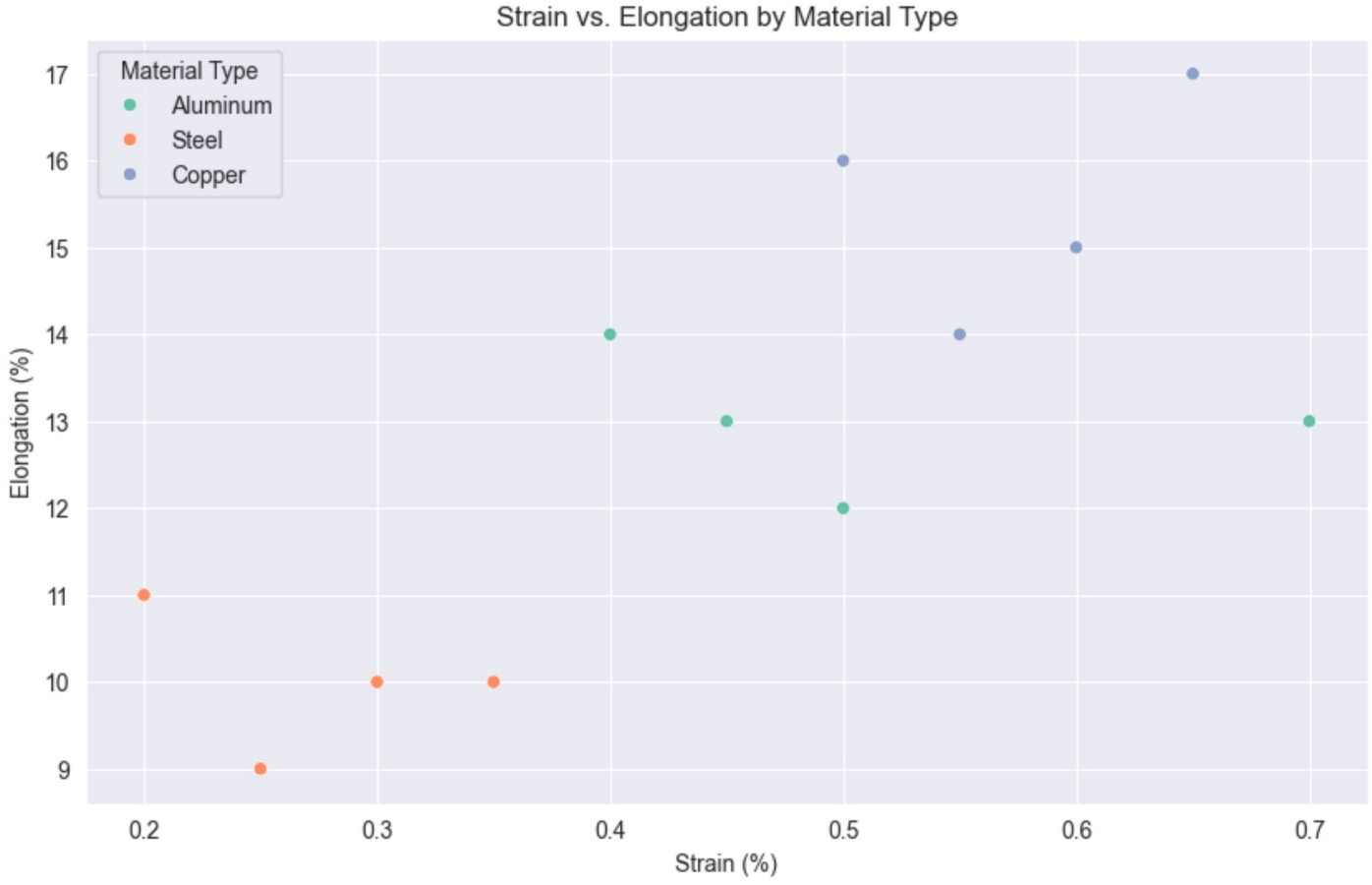
In [2]:
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

data = {
    'Material Type': ['Aluminum', 'Steel', 'Copper', 'Aluminum', 'Steel', 'Copper',
                      'Aluminum', 'Steel', 'Copper', 'Aluminum', 'Steel', 'Copper'],
    'Temperature (°C)': [25, 25, 100, 100, 200, 200, 300, 300, 300, 25, 100, 25],
    'Stress (MPa)': [200, 400, 150, 180, 380, 140, 170, 360, 130, 190, 390, 160],
    'Strain (%)': [0.5, 0.3, 0.6, 0.4, 0.2, 0.5, 0.7, 0.25, 0.65, 0.45, 0.35, 0.55],
    'Tensile Strength (MPa)': [250, 450, 200, 230, 420, 190, 220, 410, 180, 240, 440, 210],
    'Elongation (%)': [12, 10, 15, 14, 11, 16, 13, 9, 17, 13, 10, 14]
}

df = pd.DataFrame(data)
cov_stress_tensile = np.cov(df['Stress (MPa)'], df['Tensile Strength (MPa)'])[0, 1]
cov_strain_elongation = np.cov(df['Strain (%)'], df['Elongation (%)'])[0, 1]
print(f"Covariance between Stress and Tensile Strength: {cov_stress_tensile:.2f}")
print(f"Covariance between Strain and Elongation: {cov_strain_elongation:.2f}")
corr_stress_tensile = df['Stress (MPa)'].corr(df['Tensile Strength (MPa)'])
corr_strain_elongation = df['Strain (%)'].corr(df['Elongation (%)'])
print(f"Correlation between Stress and Tensile Strength: {corr_stress_tensile:.2f}")
print(f"Correlation between Strain and Elongation: {corr_strain_elongation:.2f}")
plt.figure(figsize=(10, 6))
sns.scatterplot(data=df, x='Stress (MPa)', y='Tensile Strength (MPa)', hue='Material Type', palet
plt.title('Stress vs. Tensile Strength by Material Type')
plt.ylabel('Tensile Strength (MPa)')
plt.xlabel('Stress (MPa)')
plt.show()
plt.figure(figsize=(10, 6))
sns.scatterplot(data=df, x='Strain (%)', y='Elongation (%)', hue='Material Type', palette='Set2')
plt.title('Strain vs. Elongation by Material Type')
plt.ylabel('Elongation (%)')
plt.xlabel('Strain (%)')
plt.show()
```

```
Covariance between Stress and Tensile Strength: 11800.00
Covariance between Strain and Elongation: 0.30
Correlation between Stress and Tensile Strength: 1.00
Correlation between Strain and Elongation: 0.75
```

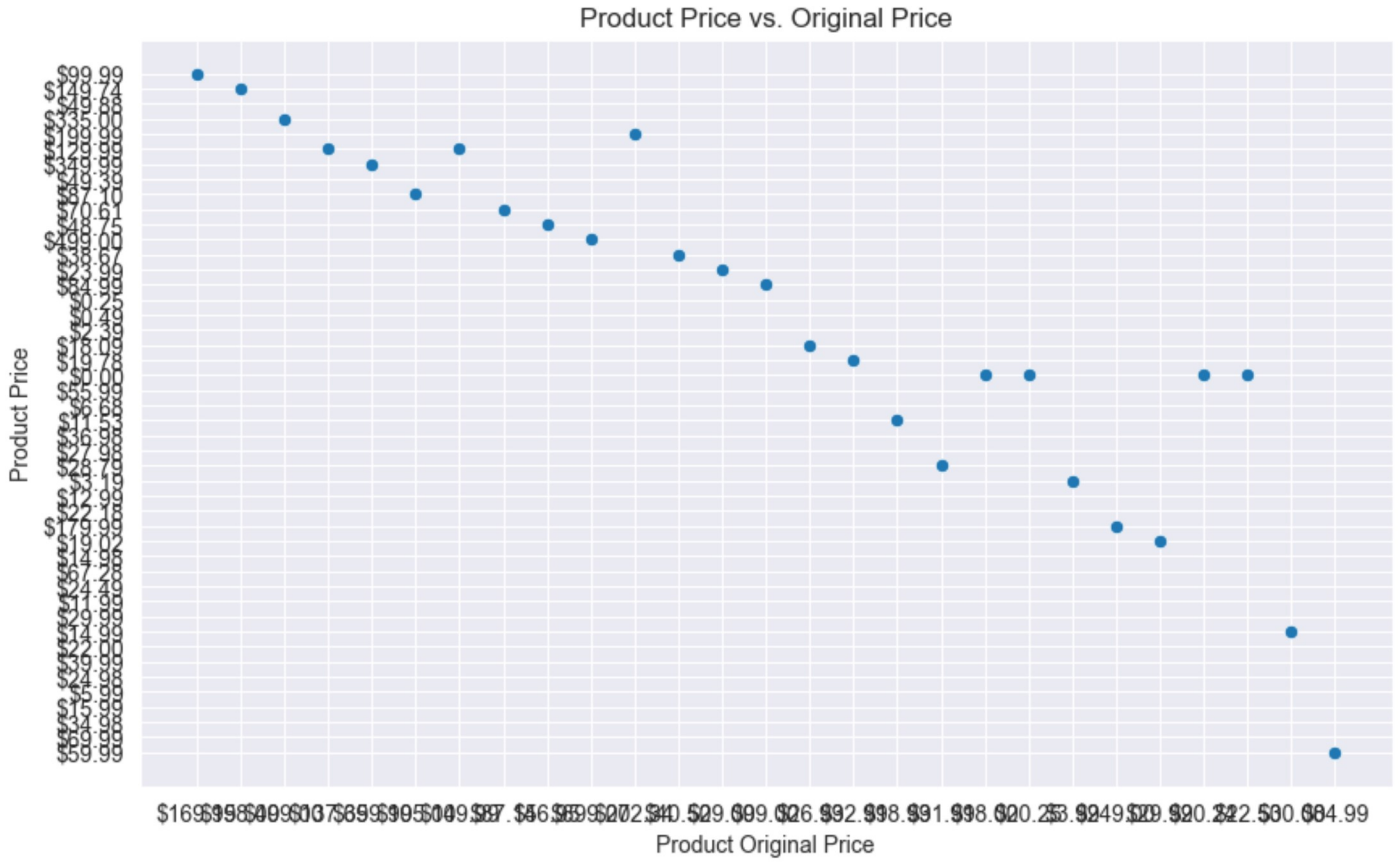




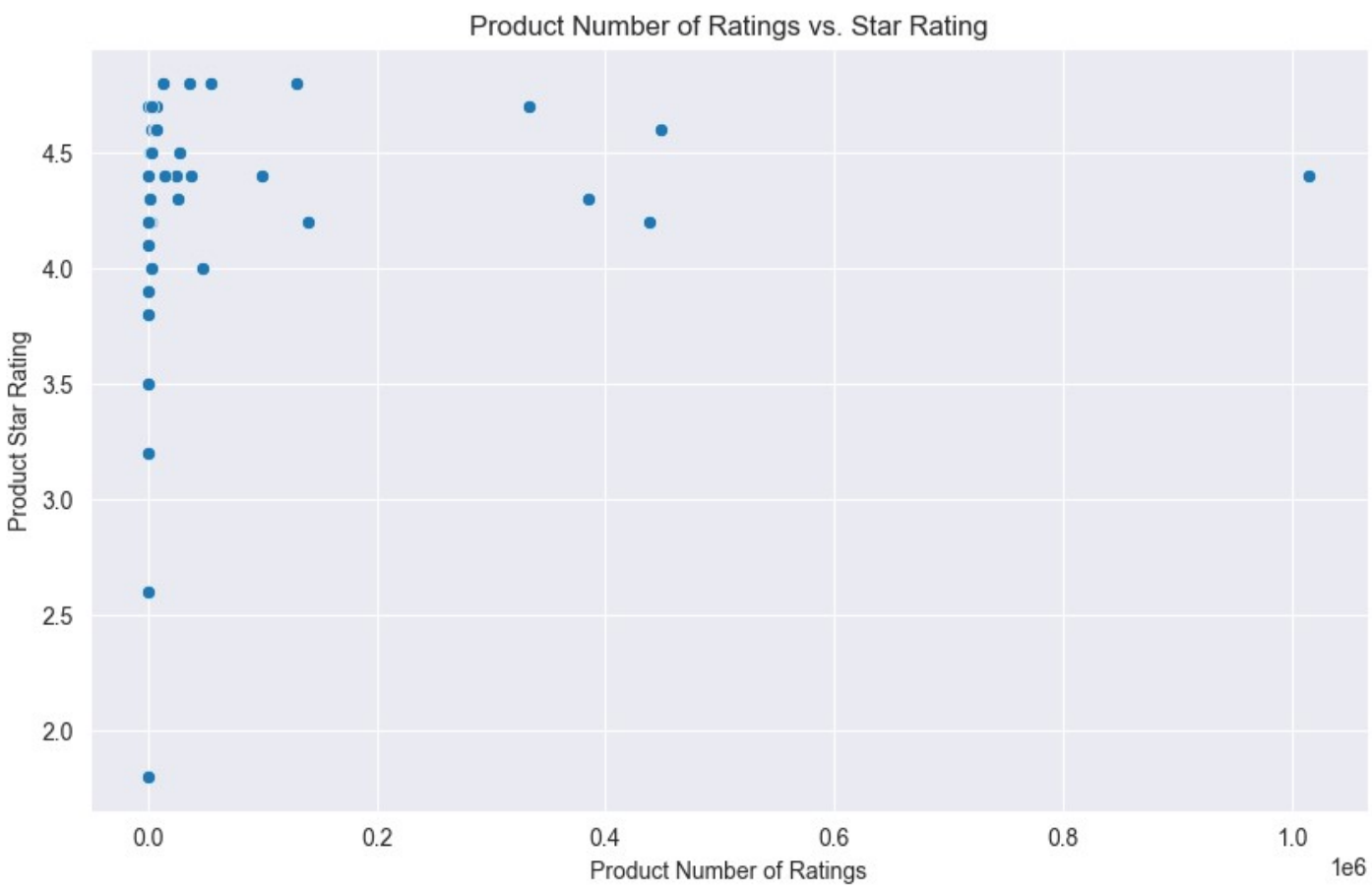
For Own Dataset:

In [3]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
data = pd.read_csv("data_set.csv")
```

In [4]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x=data['product_original_price'], y=data['product_price'])
plt.title('Product Price vs. Original Price')
plt.xlabel('Product Original Price')
plt.ylabel('Product Price')
plt.show()
```



In [5]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x=data['product_num_ratings'], y=data['product_star_rating'])
plt.title('Product Number of Ratings vs. Star Rating')
plt.xlabel('Product Number of Ratings')
plt.ylabel('Product Star Rating')
plt.show()
```


Product Number of Ratings vs. Star Rating
Product Star Rating
4.5
4.0
3.5
3.0
2.5
2.0
0.0
0.2
0.4
0.6
0.8
1.0
1e6
Product Number of Ratings