```
import pandas as pd
import re

df = pd.read_csv("IMDB Dataset.csv").head(5000)

df['clean_review'] = df['review'].apply(lambda x: re.sub('<.*?>', '',
x))  # remove HTML tags
df['clean_review'] = df['clean_review'].apply(lambda x: re.sub('[^a-
zA-Z ]', '', x))  # remove non-letters

print("Missing values:\n", df.isnull().sum())
```

```
Missing values:
 review          0
sentiment       0
clean_review    0
dtype: int64
```

```
df[['review', 'clean_review', 'sentiment']].head()
```

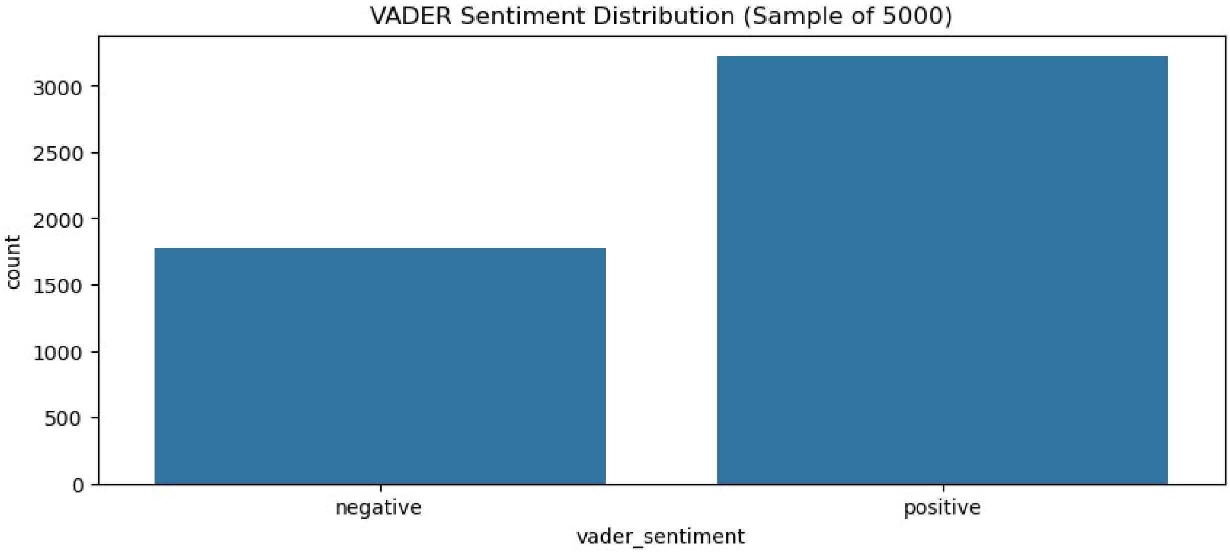
```
                                              review  \
0  One of the other reviewers has mentioned that ...   
1  A wonderful little production. <br /><br />The...   
2  I thought this was a wonderful way to spend ti...   
3  Basically there's a family where a little boy ...   
4  Petter Mattei's "Love in the Time of Money" is...   

                                        clean_review sentiment  
0  One of the other reviewers has mentioned that ...  positive  
1  A wonderful little production The filming tech...  positive  
2  I thought this was a wonderful way to spend ti...  positive  
3  Basically theres a family where a little boy J...  negative  
4  Petter Matteis Love in the Time of Money is a ...  positive  
```

```
import nltk
from nltk.sentiment.vader import SentimentIntensityAnalyzer

sid = SentimentIntensityAnalyzer()

df['vader_score'] = df['clean_review'].apply(lambda x:
sid.polarity_scores(x)['compound'])
df['vader_sentiment'] = df['vader_score'].apply(lambda x: 'positive'
if x >= 0 else 'negative')

print("VADER Accuracy \n")
df[['clean_review', 'vader_score', 'vader_sentiment']].head()
```

```
VADER Accuracy 


                                        clean_review  vader_score  \
0  One of the other reviewers has mentioned that ...      -0.9951   
```

```
1  A wonderful little production The filming tech...       0.9693
2  I thought this was a wonderful way to spend ti...       0.9712
3  Basically theres a family where a little boy J...      -0.9117
4  Petter Matteis Love in the Time of Money is a ...       0.9744

  vader_sentiment
0        negative
1        positive
2        positive
3        negative
4        positive
```

```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize=(10, 4))
sns.countplot(x='vader_sentiment', data=df)
plt.title('VADER Sentiment Distribution (Sample of 5000)')
plt.show()
```



```
from sklearn.metrics import accuracy_score, confusion_matrix,
classification_report

df['original_sentiment'] = df['sentiment'].apply(lambda x: x.lower())
df['vader_sentiment'] = df['vader_sentiment'].apply(lambda x:
x.lower())

accuracy = accuracy_score(df['original_sentiment'],
df['vader_sentiment'])
conf_matrix = confusion_matrix(df['original_sentiment'],
df['vader_sentiment'])
```

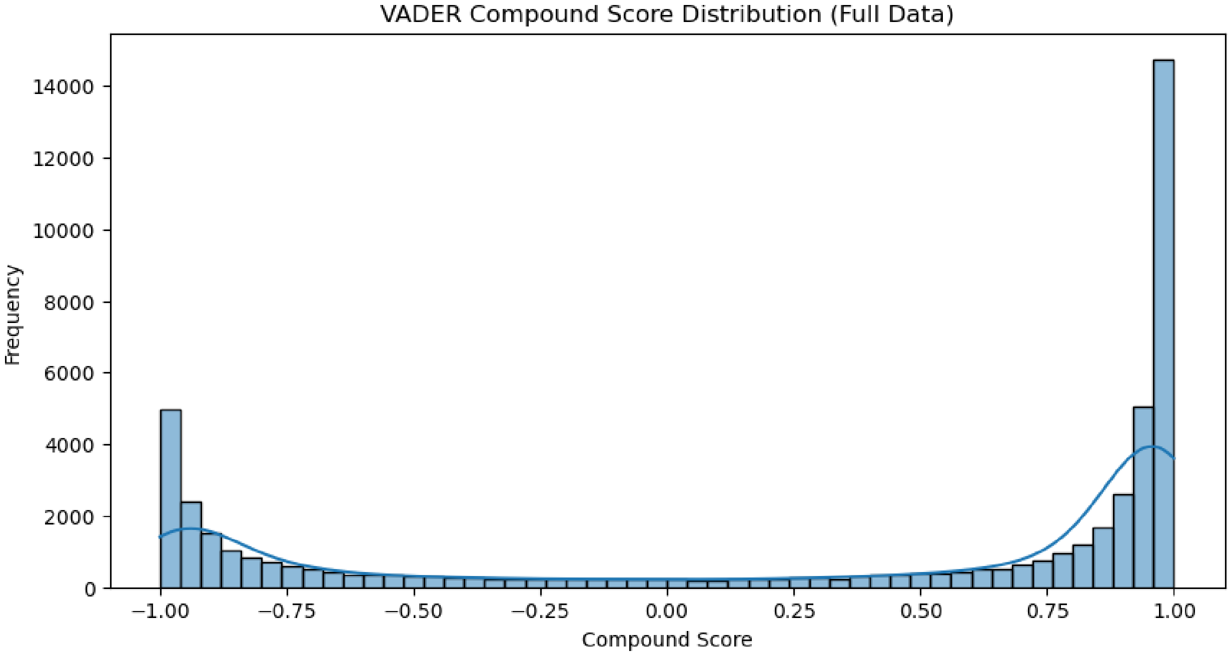
```
report = classification_report(df['original_sentiment'],
df['vader_sentiment'])

print(f"VADER Accuracy: {accuracy:.4f}")
print("Confusion Matrix:\n", conf_matrix)
print("Classification Report:\n", report)
```

```
VADER Accuracy: 0.7034
Confusion Matrix:
 [[1414 1118]
 [ 365 2103]]
Classification Report:
               precision    recall  f1-score   support

    negative       0.79      0.56      0.66      2532
    positive       0.65      0.85      0.74      2468

    accuracy                           0.70      5000
   macro avg       0.72      0.71      0.70      5000
weighted avg       0.72      0.70      0.70      5000
```

```
full_df = pd.read_csv("IMDB Dataset.csv")

full_df['clean_review'] = full_df['review'].apply(lambda x:
re.sub('<.*?>', '', x))
full_df['clean_review'] = full_df['clean_review'].apply(lambda x:
re.sub('[^a-zA-Z ]', '', x))

from tqdm import tqdm
tqdm.pandas()

sid = SentimentIntensityAnalyzer()

full_df['vader_score'] = full_df['clean_review'].progress_apply(lambda
x: sid.polarity_scores(x)['compound'])
full_df['vader_sentiment'] = full_df['vader_score'].apply(lambda x:
'positive' if x >= 0 else 'negative')
```

```
100%|
[redacted]| 50000/50000 [01:20<00:00,
619.62it/s]
```

```
full_df.to_csv("full_vader_results.csv", index=False)

import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(10, 5))
sns.histplot(full_df['vader_score'], bins=50, kde=True)
plt.title('VADER Compound Score Distribution (Full Data)')
plt.xlabel('Compound Score')
plt.ylabel('Frequency')
plt.show()
```



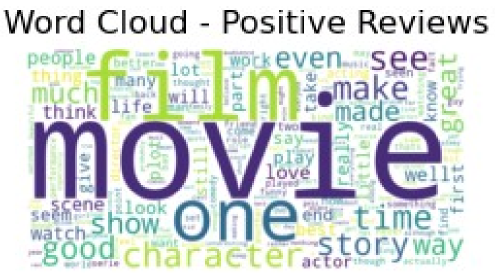
```
from wordcloud import WordCloud
import matplotlib.pyplot as plt

positive_text = ' '.join(full_df[full_df['vader_sentiment'] ==
'positive']['clean_review'])
negative_text = ' '.join(full_df[full_df['vader_sentiment'] ==
'negative']['clean_review'])

plt.figure(figsize=(14, 6))
```

```
<Figure size 1400x600 with 0 Axes>
```

```
<Figure size 1400x600 with 0 Axes>
```

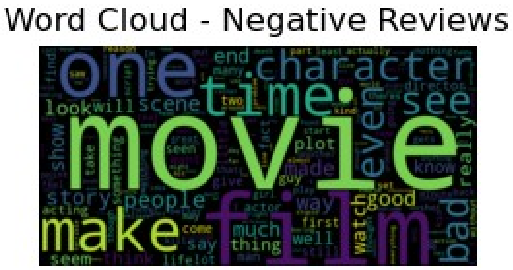
```
plt.subplot(1, 2, 1)
plt.imshow(WordCloud(width=800, height=400,
background_color='white').generate(positive_text),
interpolation='bilinear')
plt.axis('off')
plt.title('Word Cloud - Positive Reviews')
```

```
Text(0.5, 1.0, 'Word Cloud - Positive Reviews')
```



```
plt.subplot(1, 2, 2)
plt.imshow(WordCloud(width=800, height=400,
background_color='black').generate(negative_text),
interpolation='bilinear')
plt.axis('off')
plt.title('Word Cloud - Negative Reviews')
```

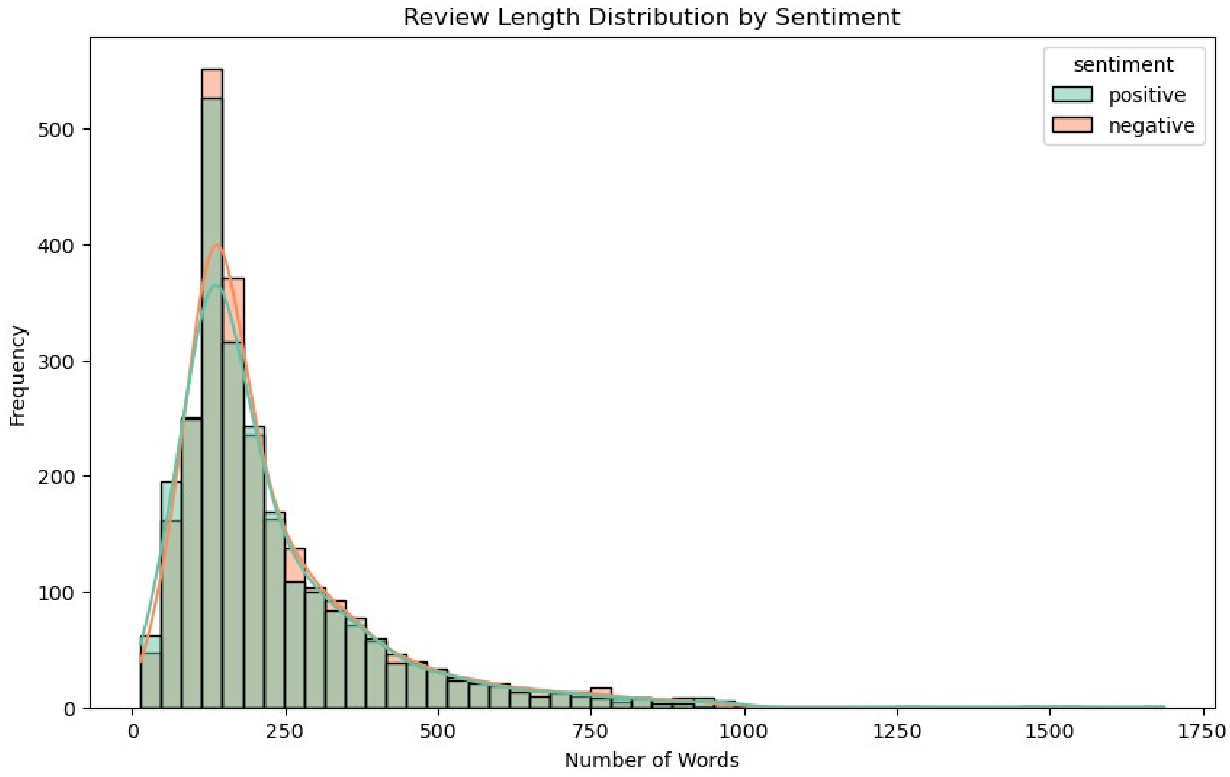
```
Text(0.5, 1.0, 'Word Cloud - Negative Reviews')
```



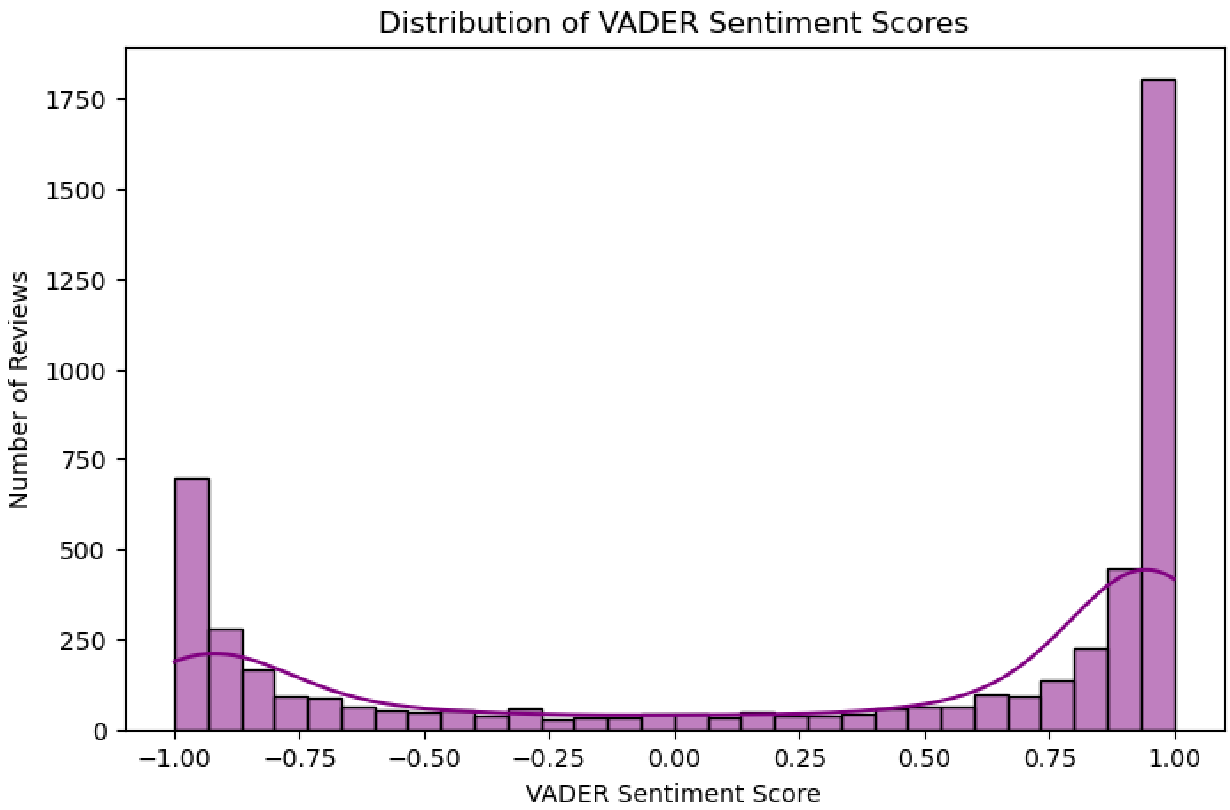
```
plt.tight_layout()
plt.show()
```

```
<Figure size 640x480 with 0 Axes>
```

```
# Add review length column
df['review_length'] = df['clean_review'].apply(lambda x:
len(x.split()))

# Plot histogram of review lengths by sentiment
plt.figure(figsize=(10, 6))
sns.histplot(data=df, x='review_length', hue='sentiment', bins=50,
kde=True, palette='Set2')
plt.title('Review Length Distribution by Sentiment')
plt.xlabel('Number of Words')
plt.ylabel('Frequency')
plt.show()
```

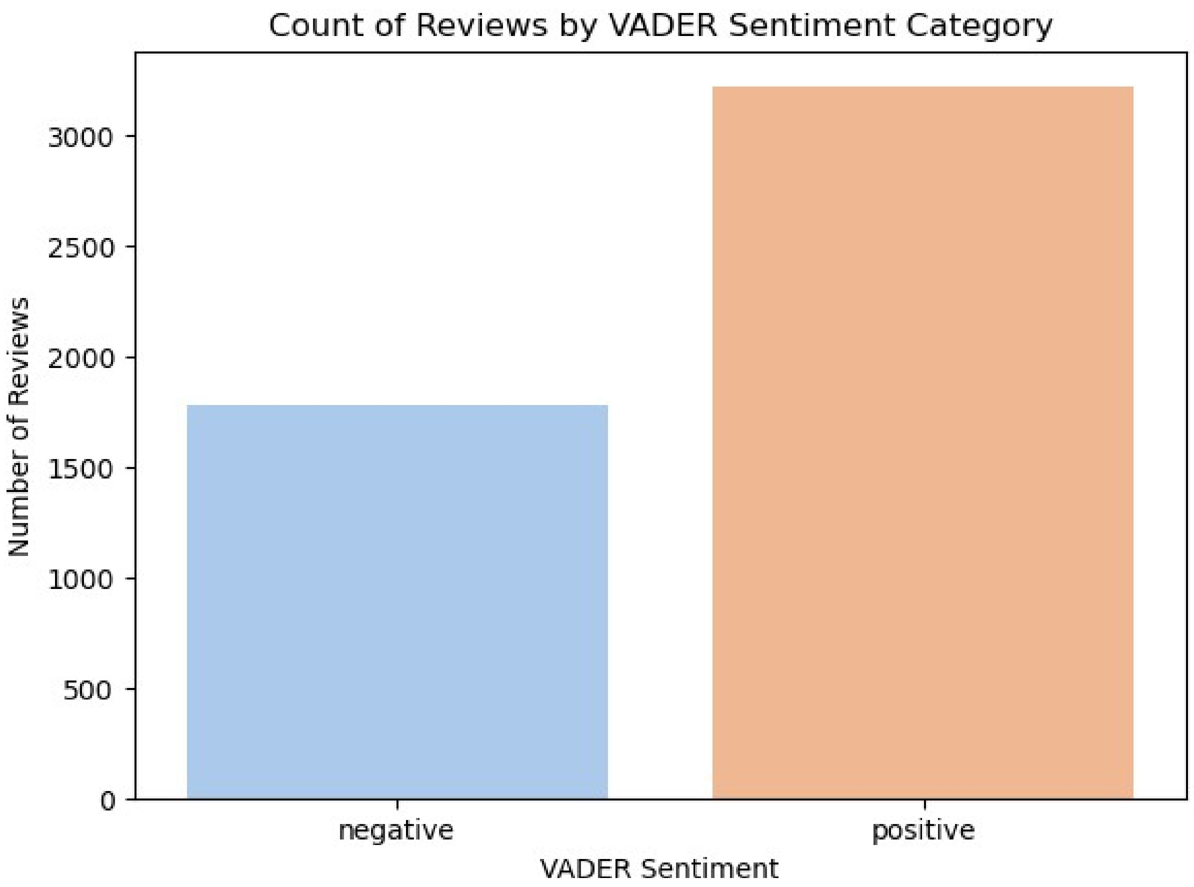


```
plt.figure(figsize=(8,5))
sns.histplot(df['vader_score'], bins=30, kde=True, color='purple')
plt.title('Distribution of VADER Sentiment Scores')
plt.xlabel('VADER Sentiment Score')
plt.ylabel('Number of Reviews')
plt.show()
```



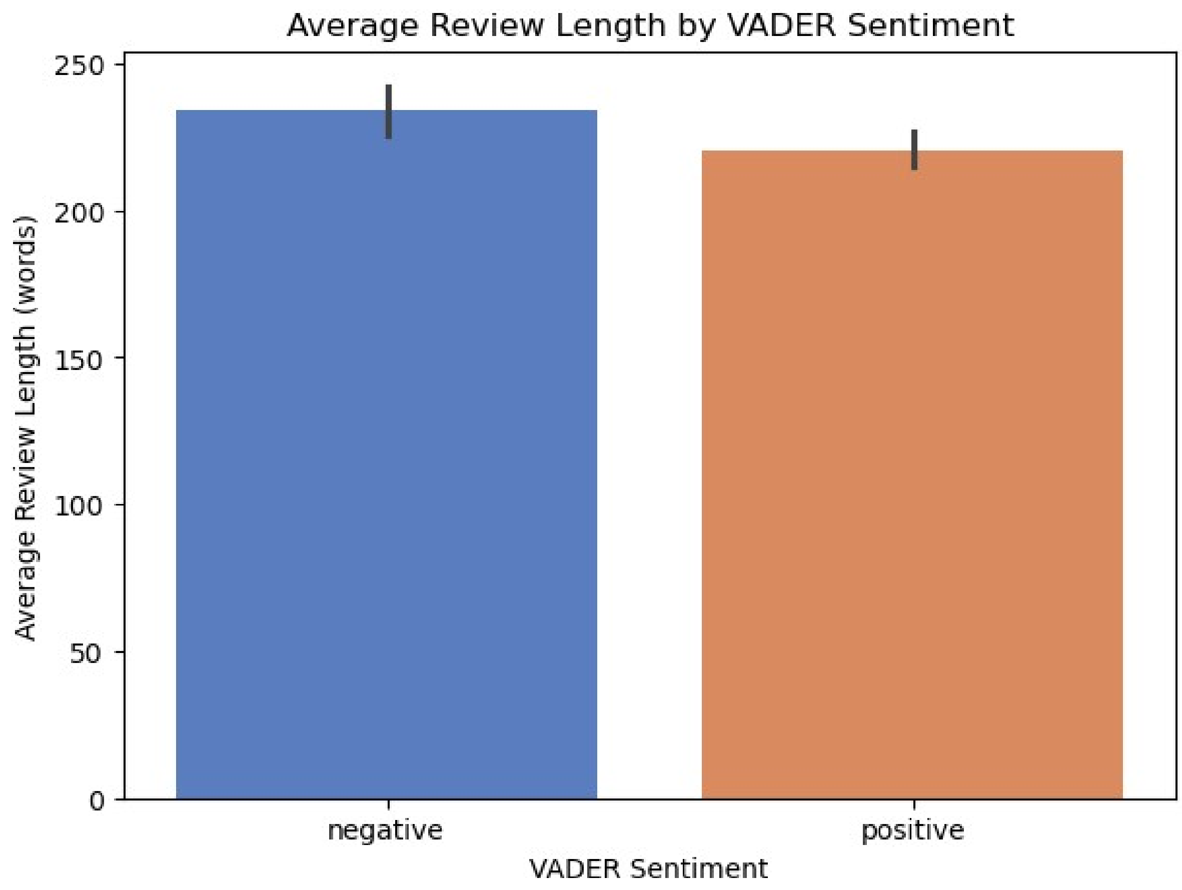
```
plt.figure(figsize=(7,5))
sns.countplot(x='vader_sentiment', data=df, palette='pastel')
plt.title('Count of Reviews by VADER Sentiment Category')
plt.xlabel('VADER Sentiment')
plt.ylabel('Number of Reviews')
plt.show()
```

```
C:\Users\suraj\AppData\Local\Temp\ipykernel_2208\1921341441.py:2:
FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be
removed in v0.14.0. Assign the `x` variable to `hue` and set
`legend=False` for the same effect.

  sns.countplot(x='vader_sentiment', data=df, palette='pastel')
```

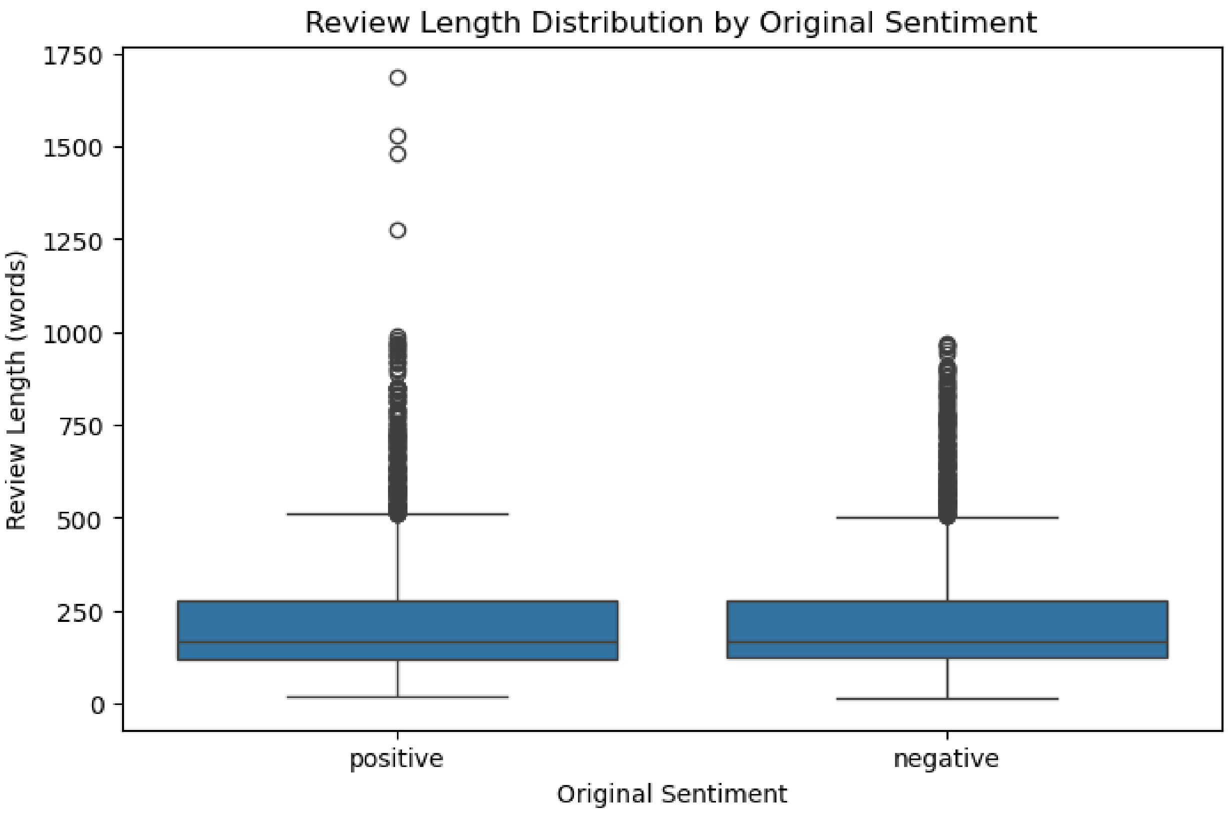


```
plt.figure(figsize=(7,5))
sns.barplot(x='vader_sentiment', y='review_length', data=df,
palette='muted')
plt.title('Average Review Length by VADER Sentiment')
plt.xlabel('VADER Sentiment')
plt.ylabel('Average Review Length (words)')
plt.show()
```

```
C:\Users\suraj\AppData\Local\Temp\ipykernel_2208\105367550.py:2:
FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be
removed in v0.14.0. Assign the `x` variable to `hue` and set
`legend=False` for the same effect.

  sns.barplot(x='vader_sentiment', y='review_length', data=df,
palette='muted')
```



```
plt.figure(figsize=(8,5))
sns.boxplot(x='original_sentiment', y='review_length', data=df)
plt.title('Review Length Distribution by Original Sentiment')
plt.xlabel('Original Sentiment')
plt.ylabel('Review Length (words)')
plt.show()
```



```
full_df.to_csv("IMDB_Reviews_with_VADER.csv", index=False)
print("Saved to IMDB_Reviews_with_VADER.csv")

Saved to IMDB_Reviews_with_VADER.csv
```