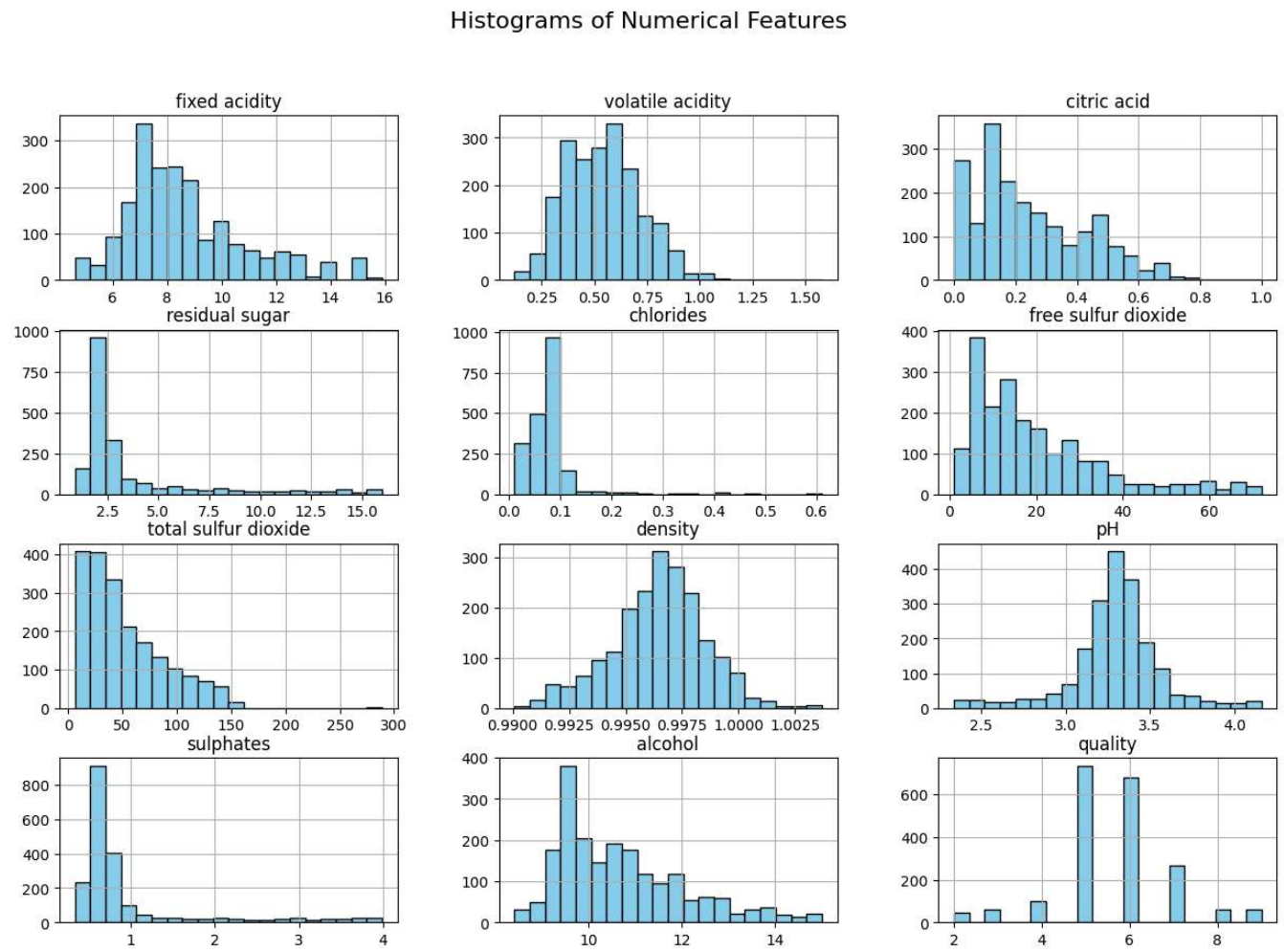
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

```
df = pd.read_csv("/content/winequality-dataset_updated.csv")
print(df.head())
```

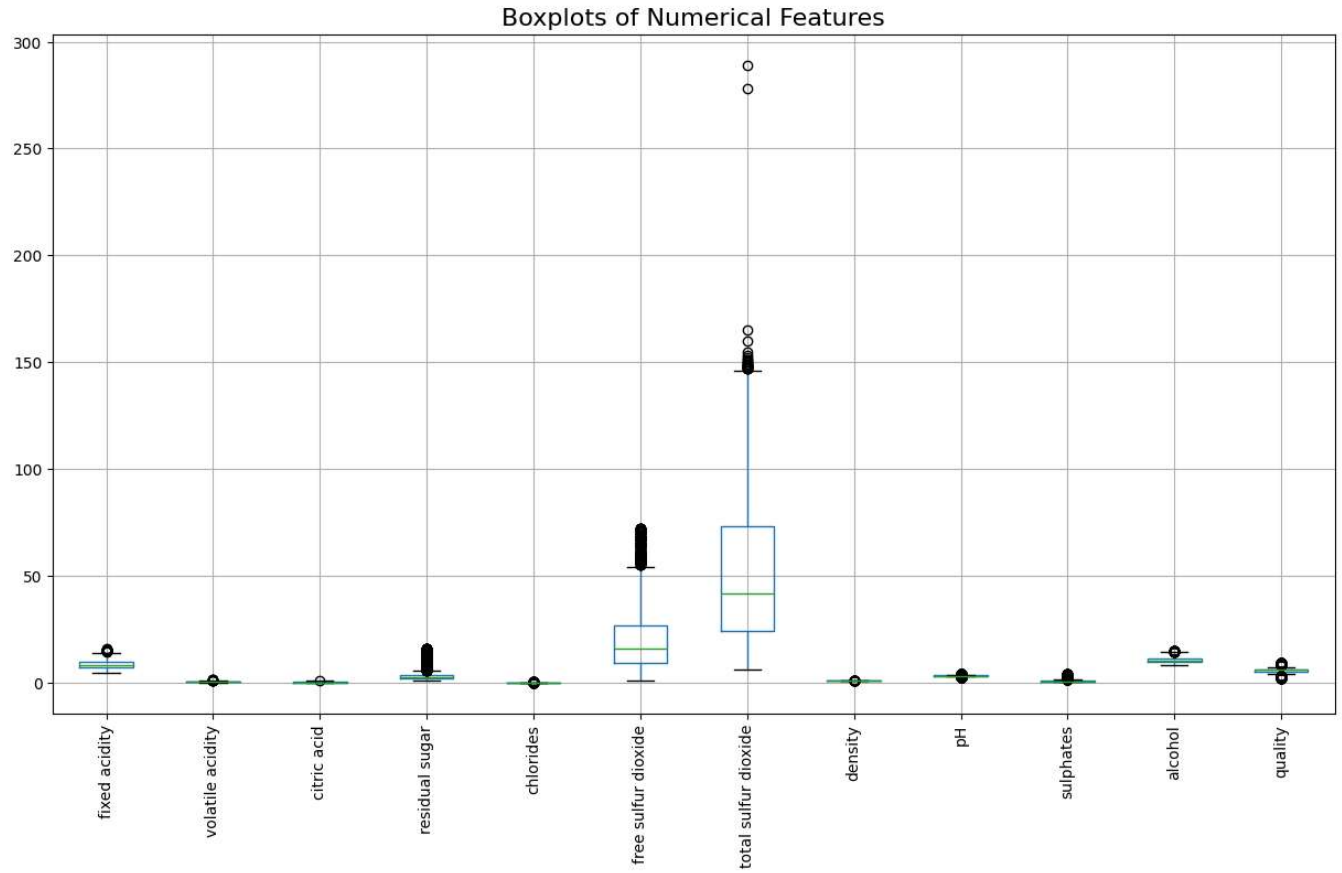
```
   fixed acidity  volatile acidity  citric acid  residual sugar  chlorides  \
0            7.3              0.70         0.00             1.9      0.076
1            7.8              0.88         0.00             2.6      0.098
2            7.8              0.76         0.04             2.3      0.092
3           11.2              0.28         0.56             1.9      0.075
4            7.2              0.70         0.00             1.9      0.076

   free sulfur dioxide  total sulfur dioxide  density    pH  sulphates  \
0                 11.0                  34.0   0.9978  3.51       0.56
1                 25.0                  67.0   0.9968  3.20       0.68
2                 15.0                  54.0   0.9970  3.26       0.65
3                 17.0                  60.0   0.9980  3.16       0.58
4                 11.0                  34.0   0.9978  3.51       0.56

   alcohol  quality
0      9.4        5
1      9.8        5
2      9.8        5
3      9.8        6
4      9.4        5
```

```
df.hist(bins=20, figsize=(15, 10), color="skyblue", edgecolor="black")
plt.suptitle("Histograms of Numerical Features", fontsize=16)
plt.show()
```



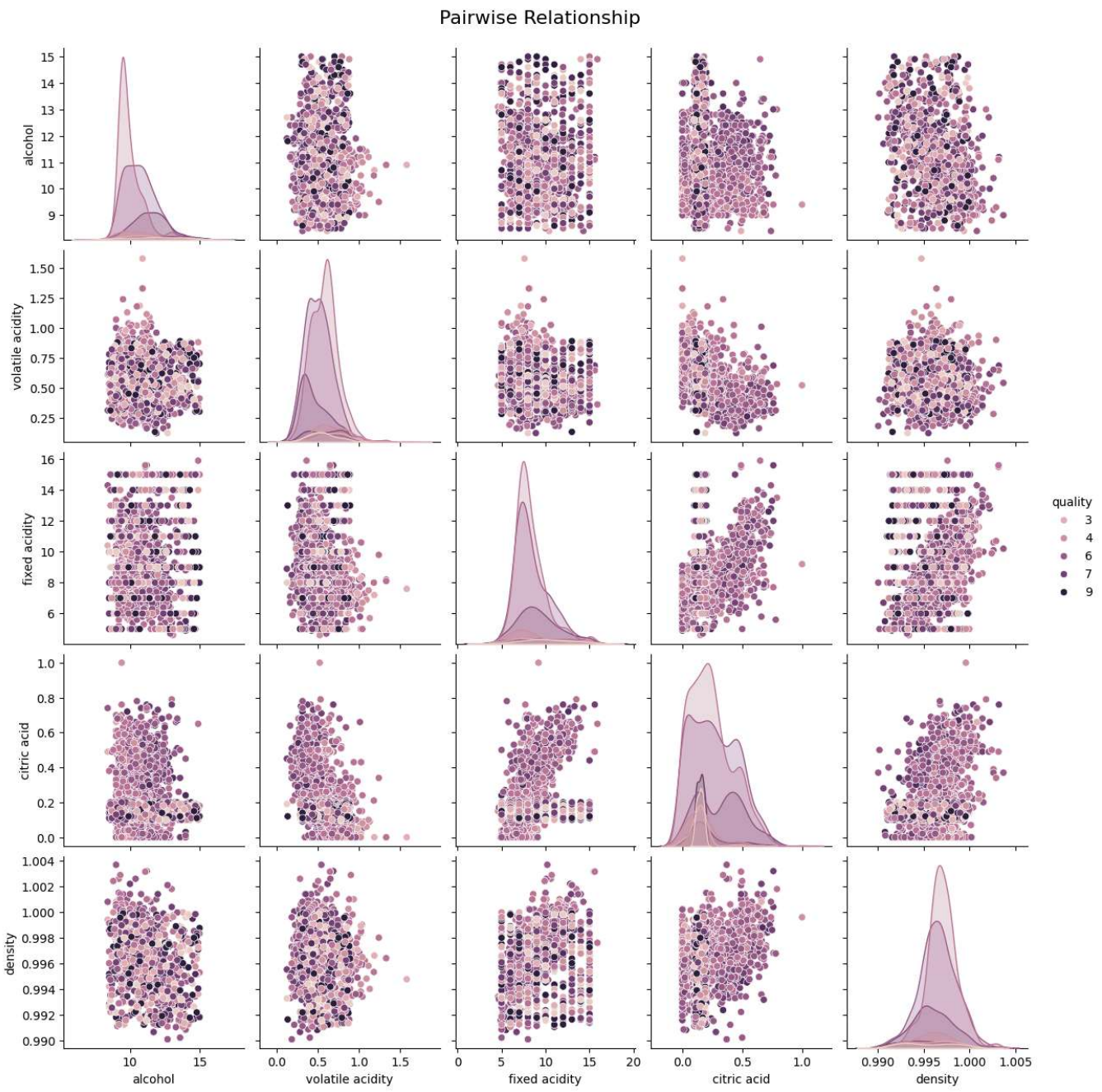

```
plt.figure(figsize=(15, 8))
```

```
df. boxplot(rot=90)
plt.title("Boxplots of Numerical Features", fontsize=16)
plt.show()
```

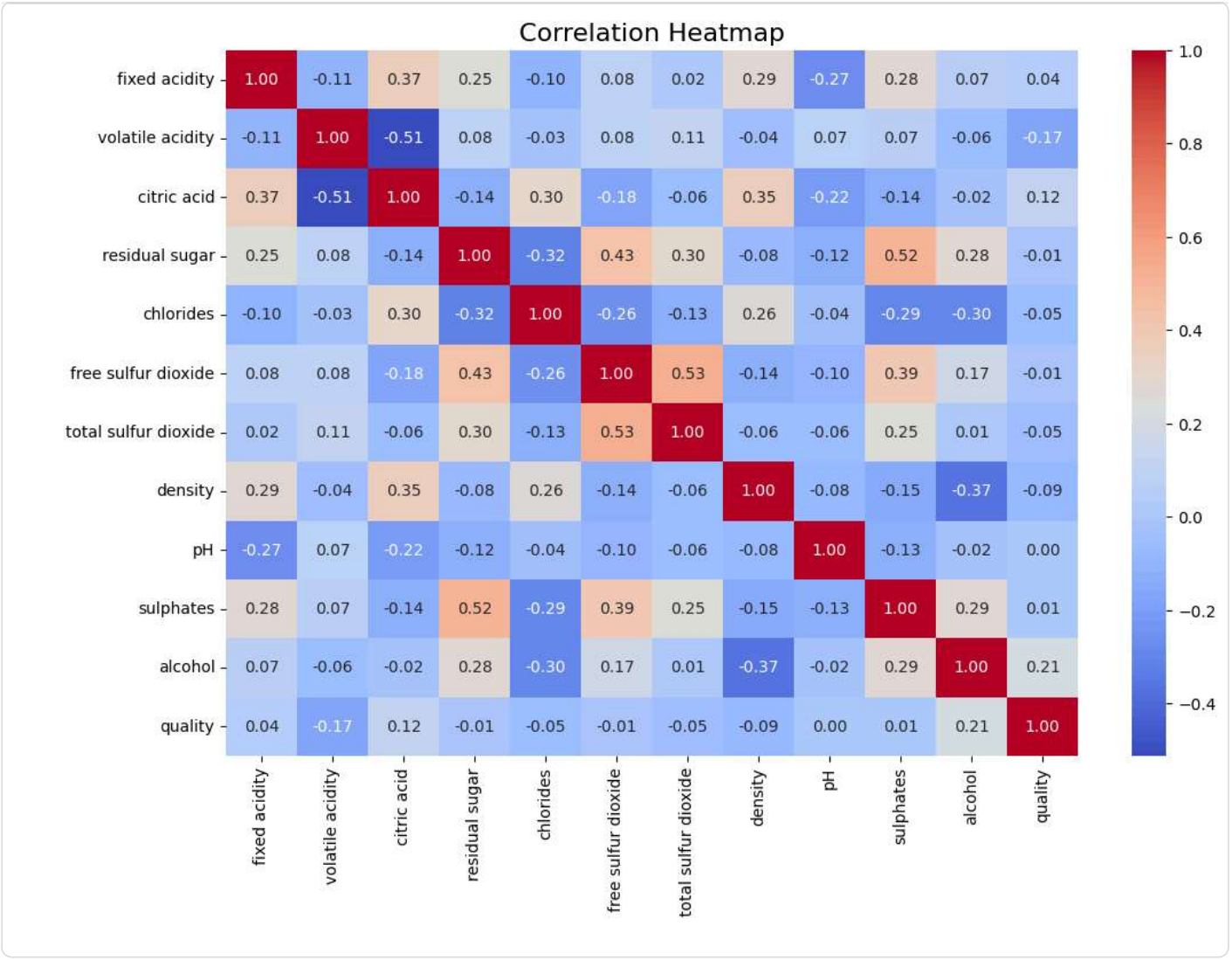



```
plt. figure(figsize=(8, 6))
sns.scatterplot(data=df, x="alcohol", y="quality", hue="quality", palette="viridis")
plt.title("scatter plot: Alcohol vs Wine Quality", fontsize=14)
plt.show()
```

```
sns.pairplot(df[['alcohol', 'volatile acidity', 'fixed acidity', 'citric acid', 'density', 'quality']], hue="quality")
plt.suptitle("Pairwise Relationship", y=1.02, fontsize=16)
plt.show()
```

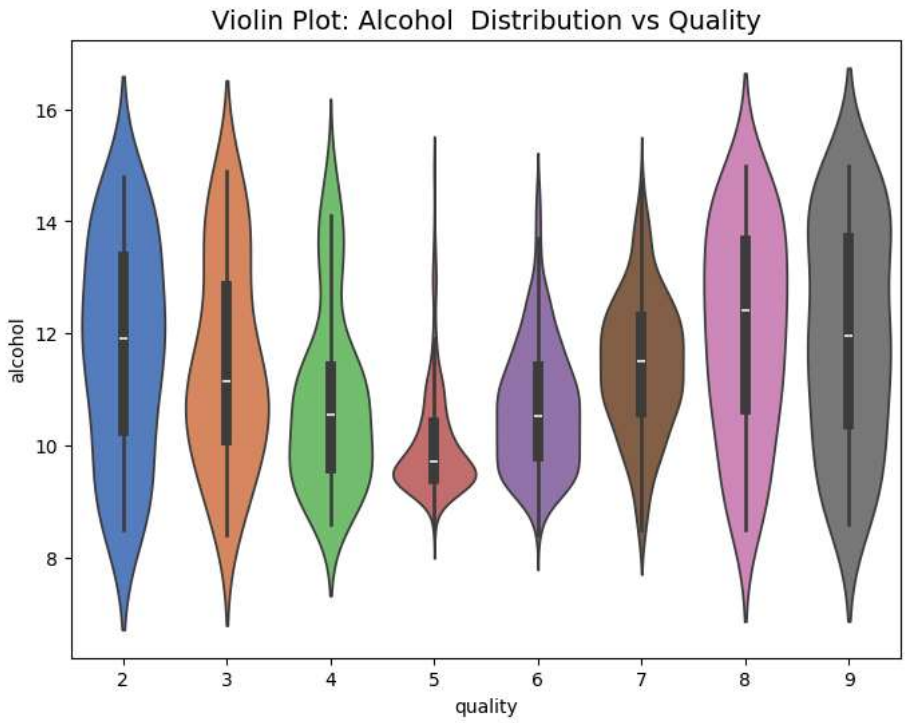



```
plt.figure(figsize=(12, 8))
sns.heatmap(df.corr(), annot=True, cmap="coolwarm", fmt=".2f")
plt.title("Correlation Heatmap", fontsize=16)
plt.show()
```



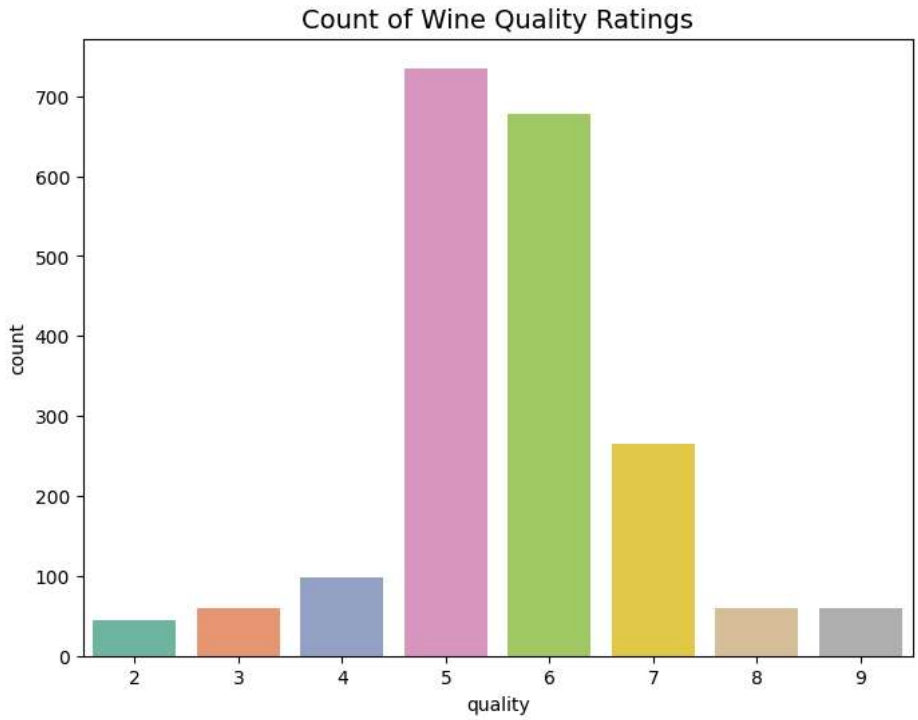

```
plt.figure(figsize=(8, 6))
sns.violinplot(data=df, x="quality", y="alcohol", palette="muted")
plt.title("Violin Plot: Alcohol  Distribution vs Quality", fontsize=14)
plt.show()
```

```
/tmp/ipython-input-955761772.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 `l

  sns.violinplot(data=df, x="quality", y="alcohol", palette="muted")
```



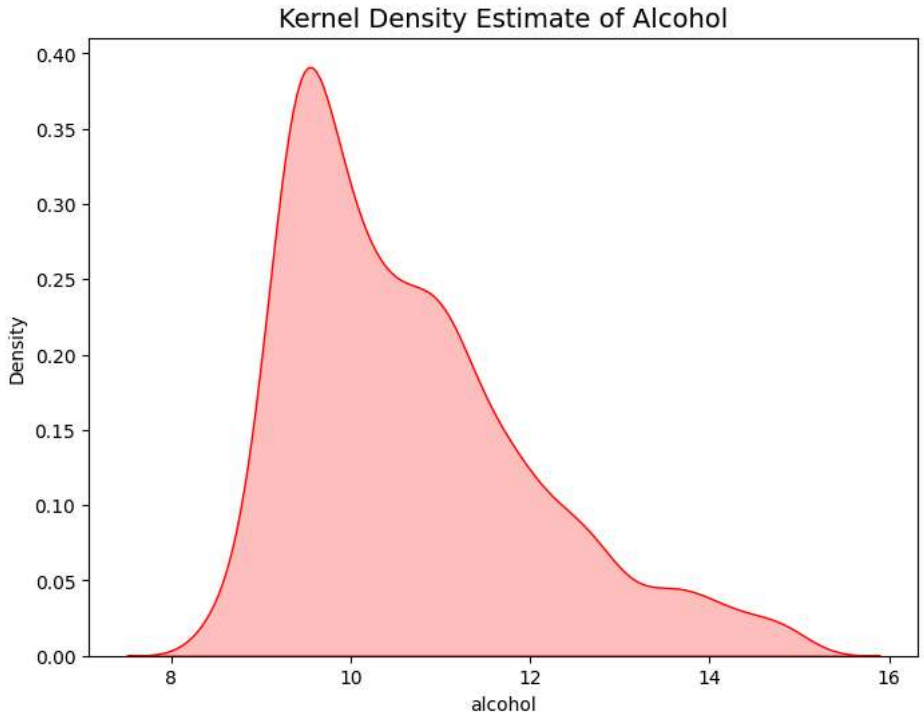

```
plt.figure(figsize=(8, 6))
sns.countplot(data=df, x="quality", palette="Set2")
plt.title("Count of Wine Quality Ratings", fontsize=14)
plt.show()
```

```
/tmp/ipython-input-31275620.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 `l

  sns.countplot(data=df, x="quality", palette="Set2")
```



```
plt.figure(figsize=(8, 6))
sns.kdeplot(df["alcohol"], shade=True, color="red")
plt.title("Kernel Density Estimate of Alcohol", fontsize=14)
plt.show()
```

```
/tmp/ipython-input-867520538.py:2: FutureWarning:

`shade` is now deprecated in favor of `fill`; setting `fill=True`.
This will become an error in seaborn v0.14.0; please update your code.

  sns.kdeplot(df["alcohol"], shade=True, color="red")
```




```
plt.figure(figsize=(8, 6))
sns.lineplot(data=df, x="pH", y="fixed acidity", color="blue")
plt.title("Line Plot: pH vs Fixed Acidity", fontsize=14)
plt.show()
```