```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from scipy import stats
from sklearn.preprocessing import StandardScaler
```

```
df = pd.read_csv("academic_performance.csv")
print("Initial Dataset:")
df.head()
```

```
Initial Dataset:
```

	Unnamed: 0	rollno	name	marks	grade
0	0	1	a	40.0	F
1	1	2	b	23.0	F
2	2	3	c	50.0	P
3	3	4	d	78.0	P
4	4	5	e	48.0	P

Next steps: Generate code with df View recommended plots New interactive sheet

```
print("Missing values in each column:")
print(df.isnull().sum())
```

```
Missing values in each column:
Unnamed: 0    0
rollno        0
name          2
marks         2
grade         2
dtype: int64
```

```
for col in df.columns:
    if df[col].dtype == 'object':
        df[col].fillna(df[col].mode()[0], inplace=True)
    else:
        df[col].fillna(df[col].mean(), inplace=True)
```

```
Missing values in each column:
Unnamed: 0    0
rollno        0
name          2
marks         2
grade         2
dtype: int64

Missing values after filling:
Unnamed: 0    0
rollno        0
name          0
marks         0
grade         0
dtype: int64
<ipython-input-3-b2eeba956f37>:9: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series th
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on whi

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' o


  df[col].fillna(df[col].mean(), inplace=True)
<ipython-input-3-b2eeba956f37>:7: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series th
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on whi

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' o


  df[col].fillna(df[col].mode()[0], inplace=True)
```

```
print("\nMissing values after filling:")
print(df.isnull().sum())
```

```

Missing values after filling:
Unnamed: 0    0
rollno        0
name          2
marks         2
grade         2
dtype: int64
```

```
numeric_cols = df.select_dtypes(include=np.number).columns.tolist()
z_scores = np.abs(stats.zscore(df[numeric_cols]))
outliers = (z_scores > 3)
```

```
print("Outliers per column (Z-score > 3):")
print(pd.DataFrame(outliers, columns=numeric_cols).sum())
```

```
Outliers per column (Z-score > 3):
Unnamed: 0    0
rollno        0
marks         0
dtype: int64
```

```
def cap_outliers(col):
    Q1 = df[col].quantile(0.25)
    Q3 = df[col].quantile(0.75)
    IQR = Q3 - Q1
    lower = Q1 - 1.5 * IQR
    upper = Q3 + 1.5 * IQR
    df[col] = np.where(df[col] > upper, upper,
                       np.where(df[col] < lower, lower, df[col]))

for col in numeric_cols:
    cap_outliers(col)

z_scores = np.abs(stats.zscore(df[numeric_cols]))
print("\nOutliers after capping:")
print(pd.DataFrame((z_scores > 3), columns=numeric_cols).sum())
```

```

Outliers after capping:
Unnamed: 0    0
rollno        0
marks         0
dtype: int64
```

```
column_to_transform = numeric_cols[0]
scaler = StandardScaler()
df[column_to_transform + '_scaled'] = scaler.fit_transform(df[[column_to_transform]])

df[[column_to_transform, column_to_transform + '_scaled']].head()
```

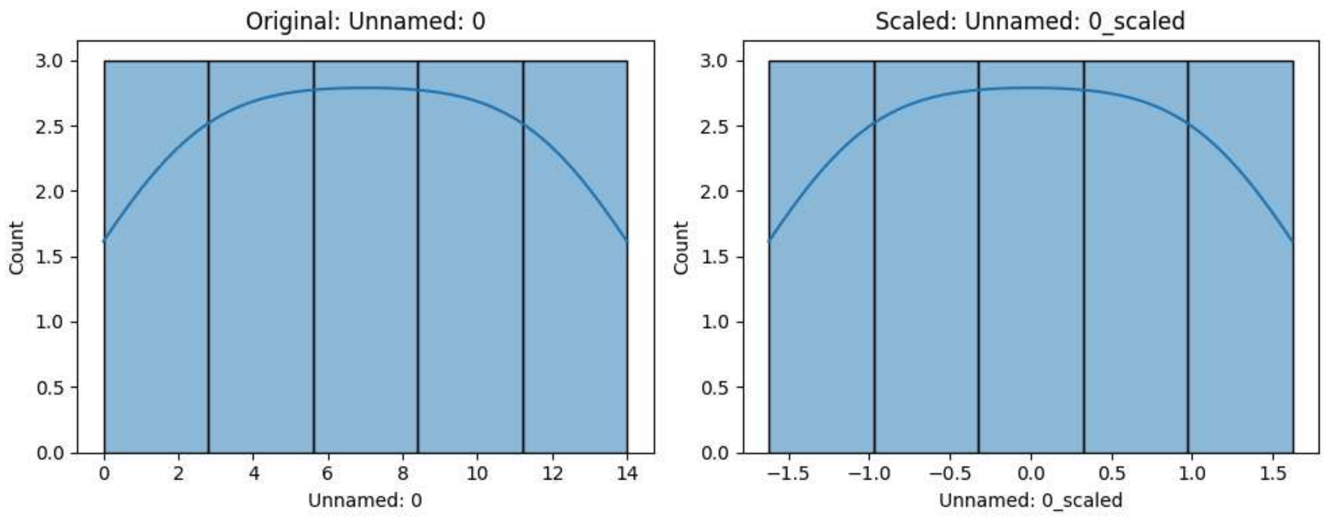
	Unnamed: 0	Unnamed: 0_scaled
0	0.0	-1.620185
1	1.0	-1.388730
2	2.0	-1.157275
3	3.0	-0.925820
4	4.0	-0.694365

```
df[[column_to_transform, column_to_transform + '_scaled']].head()
```

	Unnamed: 0	Unnamed: 0_scaled
0	0.0	-1.620185
1	1.0	-1.388730
2	2.0	-1.157275
3	3.0	-0.925820
4	4.0	-0.694365

```
plt.figure(figsize=(10,4))
plt.subplot(1,2,1)
sns.histplot(df[column_to_transform], kde=True)
plt.title(f"Original: {column_to_transform}")

plt.subplot(1,2,2)
sns.histplot(df[column_to_transform + '_scaled'], kde=True)
plt.title(f"Scaled: {column_to_transform + '_scaled'}")
plt.tight_layout()
plt.show()
```



```
Start coding or generate with AI.
```