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

df = pd.read_csv(r"C:\Users\Jayditya\Downloads\
StudentsPerformance0.csv")
df.head()
```

```
   gender race/ethnicity parental level of education         lunch  \
0  female        group B           bachelor's degree      standard
1  female        group C                some college      standard
2  female        group B            master's degree      standard
3    male        group A          associate's degree  free/reduced
4    male        group C                some college      standard

  test preparation course  math score  reading score  writing score
0                    none          72             72             74
1               completed          69             90             88
2                    none          90             95             93
3                    none          47             57             44
4                    none          76             78             75
```

```
print(df.columns)
```

```
Index(['gender', 'race/ethnicity', 'parental level of education',
'lunch',
       'test preparation course', 'math score', 'reading score',
       'writing score'],
      dtype='object')
```

```
print(df.isnull().sum())
```

```
gender                         0
race/ethnicity                 0
parental level of education    0
lunch                          0
test preparation course        4
math score                     0
reading score                  0
writing score                  0
dtype: int64
```

```
# Fill missing values in 'test preparation course' with mode
df['test preparation course'] = df['test preparation
course'].fillna(df['test preparation course'].mode()[0])

Q1 = df['math score'].quantile(0.25)
Q3 = df['math score'].quantile(0.75)
IQR = Q3 - Q1
```

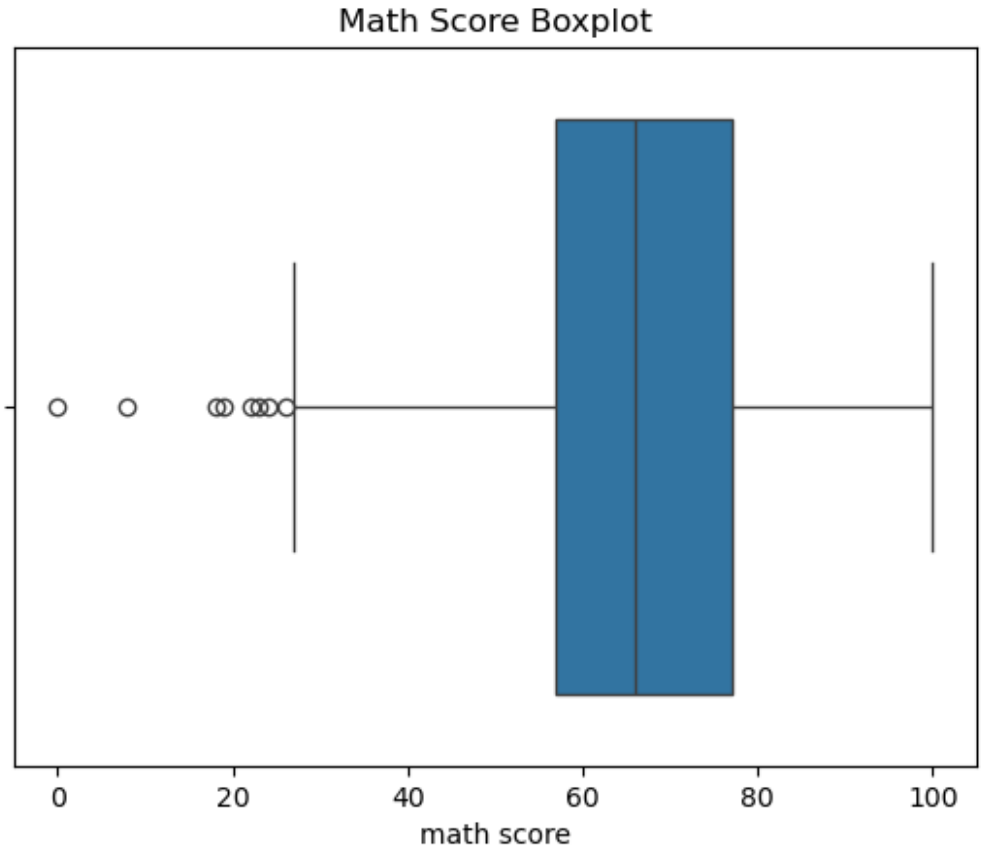
```
lower_bound = Q1 - 1.5 * IQR
upper_bound = Q3 + 1.5 * IQR

outliers = df[(df['math score'] < lower_bound) | (df['math score'] >
upper_bound)]
print(outliers)
```

```
     gender race/ethnicity parental level of education
lunch  \
17   female        group B            some high school  free/reduced

59   female        group C            some high school  free/reduced

145  female        group C                some college  free/reduced

338  female        group B            some high school  free/reduced

466  female        group D          associate's degree  free/reduced

787  female        group B                some college      standard

842  female        group B                 high school  free/reduced

980  female        group B                 high school  free/reduced


    test preparation course  math score  reading score  writing score

17                     none          18             32             28

59                     none           0             17             10

145                    none          22             39             33

338                    none          24             38             27

466                    none          26             31             38

787                    none          19             38             32

842               completed          23             44             36

980                    none           8             24             23
```

```
df_no_outliers = df[(df['math score'] >= lower_bound) & (df['math
score'] <= upper_bound)]
print(df_no_outliers.shape)
```

```
(992, 8)
```

```
sns.boxplot(x=df['math score'])
plt.title("Math Score Boxplot")
plt.show()
```




```
df['zscore'] = (df['math score'] - df['math score'].mean()) / df['math
score'].std()
print(df['zscore'])
```

```
0      0.389828
1      0.191979
2      1.576922
3     -1.258913
4      0.653627
         ...
995    1.445023
996   -0.269668
997   -0.467517
998    0.126030
999    0.719577
Name: zscore, Length: 1000, dtype: float64
```

```
sns.kdeplot(df['math score'])
plt.title("Distribution of Math Scores")
```

```
plt.xlabel("Math Score")
plt.ylabel("Density")
plt.show()
```