Load the Dataset

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
df = pd.read_csv(r"C:\Users\saipr\Downloads\student\student-mat.csv",
delimiter=';')
df.head()
```

```
  school sex  age address famsize Pstatus  Medu  Fedu     Mjob
Fjob  ...  \
0     GP   F   18       U     GT3       A     4     4  at_home
teacher  ...
1     GP   F   17       U     GT3       T     1     1  at_home
other  ...
2     GP   F   15       U     LE3       T     1     1  at_home
other  ...
3     GP   F   15       U     GT3       T     4     2   health
services  ...
4     GP   F   16       U     GT3       T     3     3    other
other  ...

  famrel freetime  goout  Dalc  Walc health absences  G1  G2  G3
0      4        3      4     1     1      3        6   5   6   6
1      5        3      3     1     1      3        4   5   5   6
2      4        3      2     2     3      3       10   7   8  10
3      3        2      2     1     1      5        2  15  14  15
4      4        3      2     1     2      5        4   6  10  10

[5 rows x 33 columns]
```

Data Exploration

```
print("Missing Values:\n", df.isnull().sum())
print("\nData Types:\n", df.dtypes)
print("\nDataset Shape:", df.shape)
```

```
Missing Values:
 school        0
sex           0
age           0
address       0
famsize       0
Pstatus       0
Medu          0
```

```
Fedu          0
Mjob          0
Fjob          0
reason        0
guardian      0
traveltime    0
studytime     0
failures      0
schoolsup     0
famsup        0
paid          0
activities    0
nursery       0
higher        0
internet      0
romantic      0
famrel        0
freetime      0
goout         0
Dalc          0
Walc          0
health        0
absences      0
G1            0
G2            0
G3            0
dtype: int64

Data Types:
 school        object
sex           object
age            int64
address       object
famsize       object
Pstatus       object
Medu           int64
Fedu           int64
Mjob          object
Fjob          object
reason        object
guardian      object
traveltime     int64
studytime      int64
failures       int64
schoolsup     object
famsup        object
paid          object
activities    object
nursery       object
```

```
higher        object
internet      object
romantic      object
famrel         int64
freetime       int64
goout          int64
Dalc           int64
Walc           int64
health         int64
absences       int64
G1             int64
G2             int64
G3             int64
dtype: object

Dataset Shape: (395, 33)
```

Data Cleaning

```
initial_rows = df.shape[0]
df.drop_duplicates(inplace=True)
final_rows = df.shape[0]
print("Duplicate Rows Removed:", initial_rows - final_rows)
```

```
Duplicate Rows Removed: 0
```

Data Analysis Questions

```
avg_g3 = df['G3'].mean()
print("Average Final Grade (G3):", round(avg_g3, 2))
above_15 = df[df['G3'] > 15].shape[0]
print("Students with G3 > 15:", above_15)
correlation = df['studytime'].corr(df['G3'])
print("Correlation between study time and G3:", round(correlation, 2))
gender_avg = df.groupby('sex')['G3'].mean()
print("\nAverage G3 by Gender:\n", gender_avg)
```

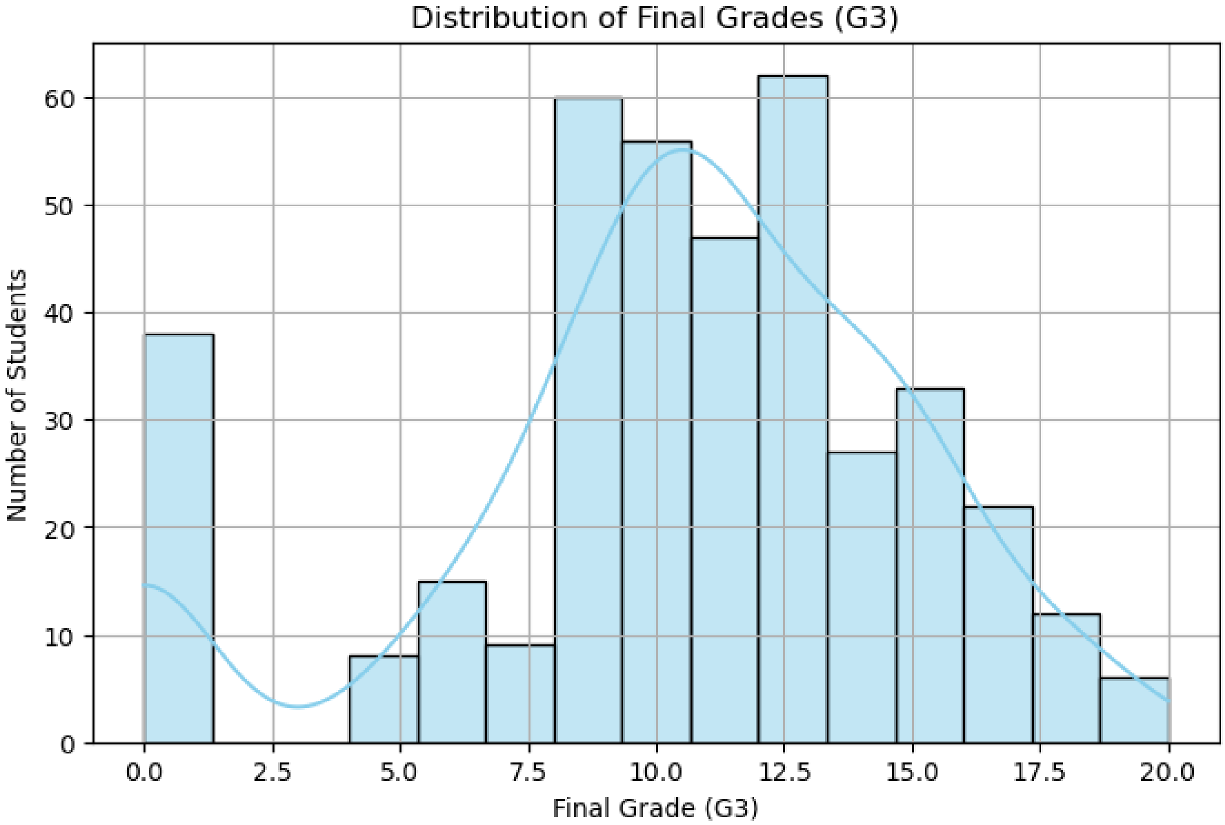
```
Average Final Grade (G3): 10.42
Students with G3 > 15: 40
Correlation between study time and G3: 0.1

Average G3 by Gender:
 sex
F     9.966346
M    10.914439
Name: G3, dtype: float64
```

Data Visualization

Histogram

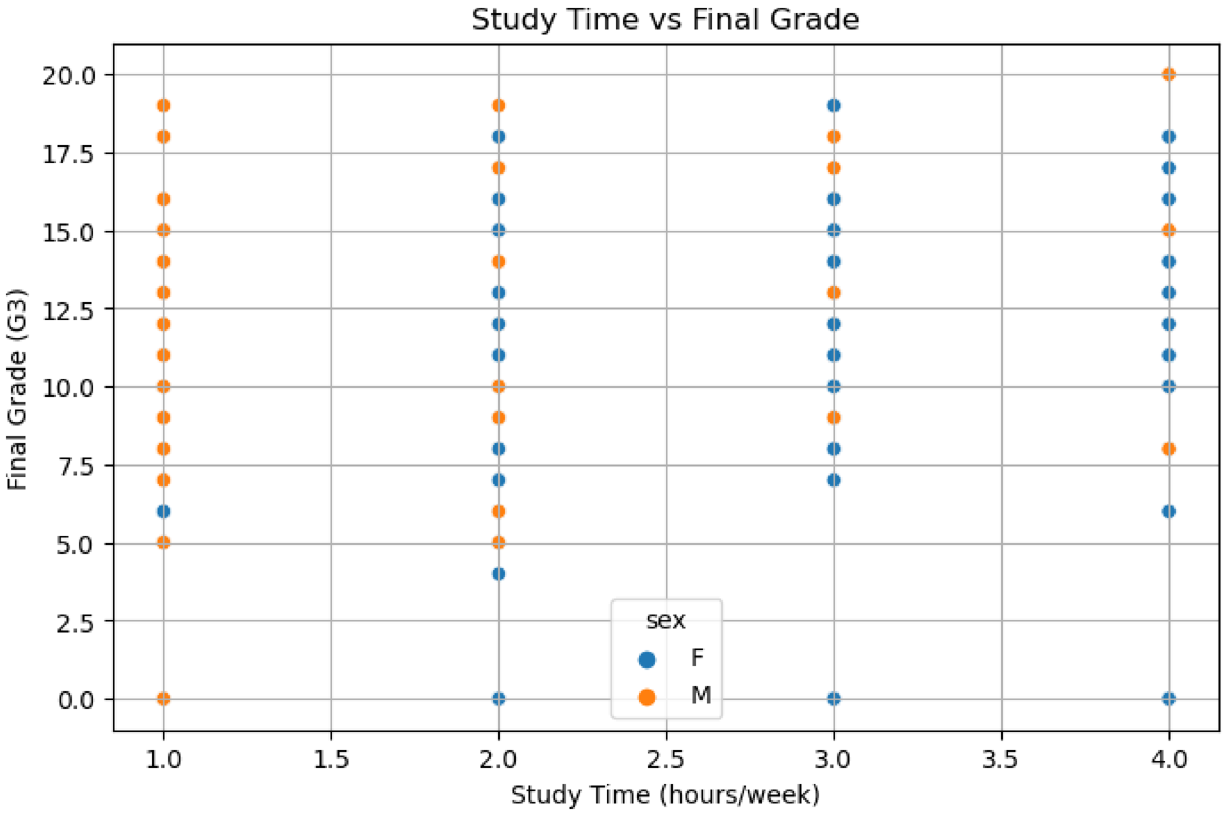
```
plt.figure(figsize=(8, 5))
sns.histplot(df['G3'], bins=15, kde=True, color='skyblue')
plt.title('Distribution of Final Grades (G3)')
plt.xlabel('Final Grade (G3)')
plt.ylabel('Number of Students')
plt.grid(True)
plt.show()
```

```
C:\Users\saipr\anaconda3\Lib\site-packages\seaborn\_oldcore.py:1119:
FutureWarning: use_inf_as_na option is deprecated and will be removed
in a future version. Convert inf values to NaN before operating
instead.
  with pd.option_context('mode.use_inf_as_na', True):
```



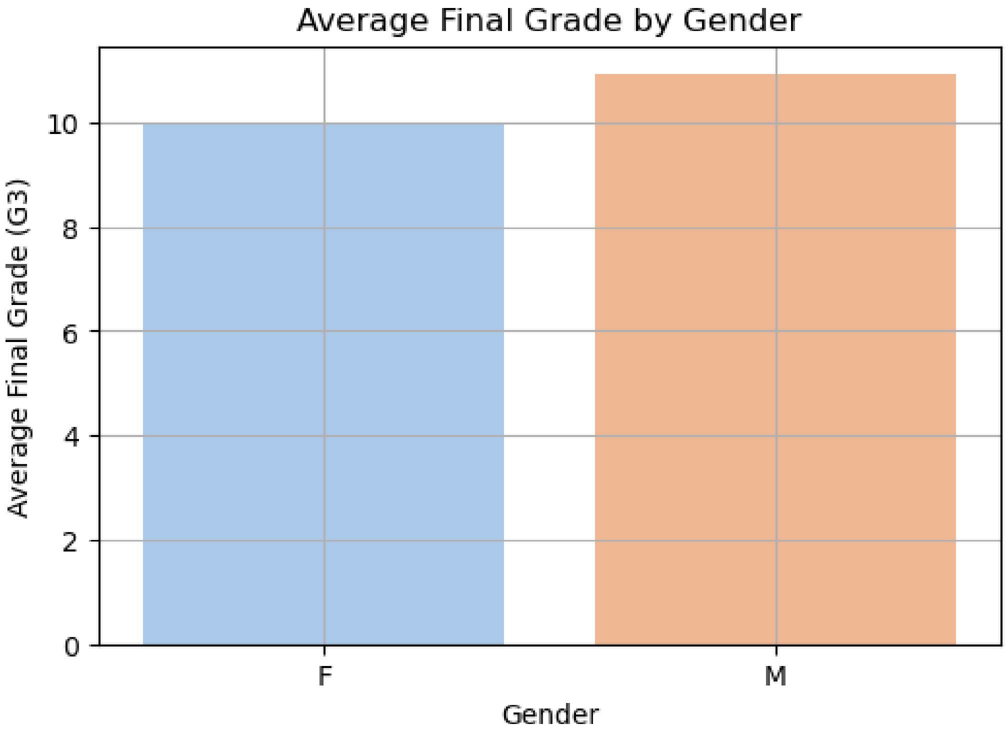
Scatter plot

```
plt.figure(figsize=(8, 5))
sns.scatterplot(data=df, x='studytime', y='G3', hue='sex')
plt.title('Study Time vs Final Grade')
plt.xlabel('Study Time (hours/week)')
plt.ylabel('Final Grade (G3)')
plt.grid(True)
plt.show()
```



Bar Chart

```
avg_by_gender = df.groupby('sex')['G3'].mean().reset_index()
plt.figure(figsize=(6, 4))
sns.barplot(data=avg_by_gender, x='sex', y='G3', palette='pastel')
plt.title('Average Final Grade by Gender')
plt.xlabel('Gender')
plt.ylabel('Average Final Grade (G3)')
plt.grid(True)
plt.show()
```


Average Final Grade by Gender
Average Final Grade (G3)
0
2
4
6
8
10
F
M
Gender