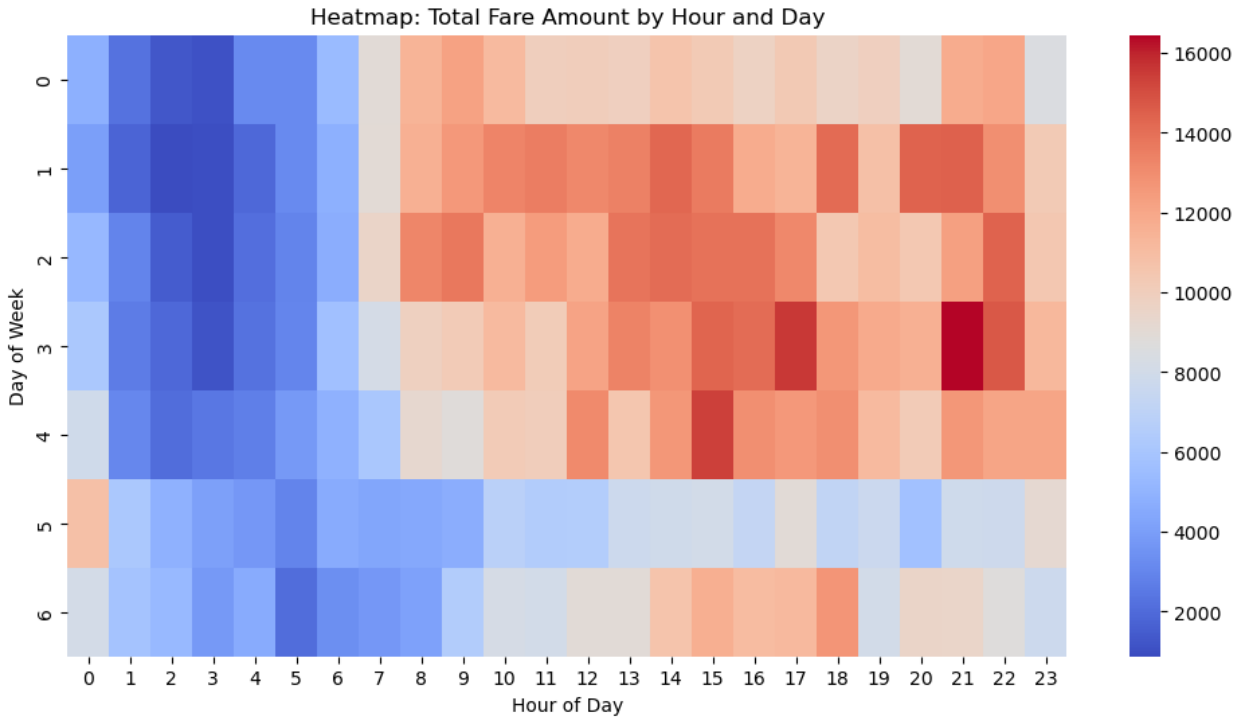
```python
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
from statsmodels.graphics.tsaplots import plot_acf
from statsmodels.tsa.seasonal import seasonal_decompose

file_path = "Downloads/train.csv/taxi dataset.csv"
df = pd.read_csv(file_path)
print(df.head())
```

```
   trip_distance  rate_code store_and_fwd_flag  payment_type
fare_amount  \
0           9.01          1                  N             1
26.0
1           0.20          1                  N             1
3.0
2           9.65          1                  N             1
41.5
3           9.50          1                  N             1
30.0
4           5.80          1                  N             1
21.5

   extra  mta_tax  tip_amount  tolls_amount  imp_surcharge
total_amount  \
0    0.0      0.5        8.14          5.76            0.3
40.70
1    0.0      0.5        0.75          0.00            0.3
4.55
2    0.0      0.5        9.61          5.76            0.3
57.67
3    0.5      0.5        9.25          5.76            0.3
46.31
4    0.5      0.5        4.56          0.00            0.3
27.36

   pickup_location_id  dropoff_location_id  year  month  day
day_of_week  \
0                 262                  138  2018      3    7
2
1                 263                  236  2018      2   25
6
2                 138                  230  2018      1   29
0
3                 186                  138  2018      9   25
1
4                 162                   87  2018      8   20
0
```

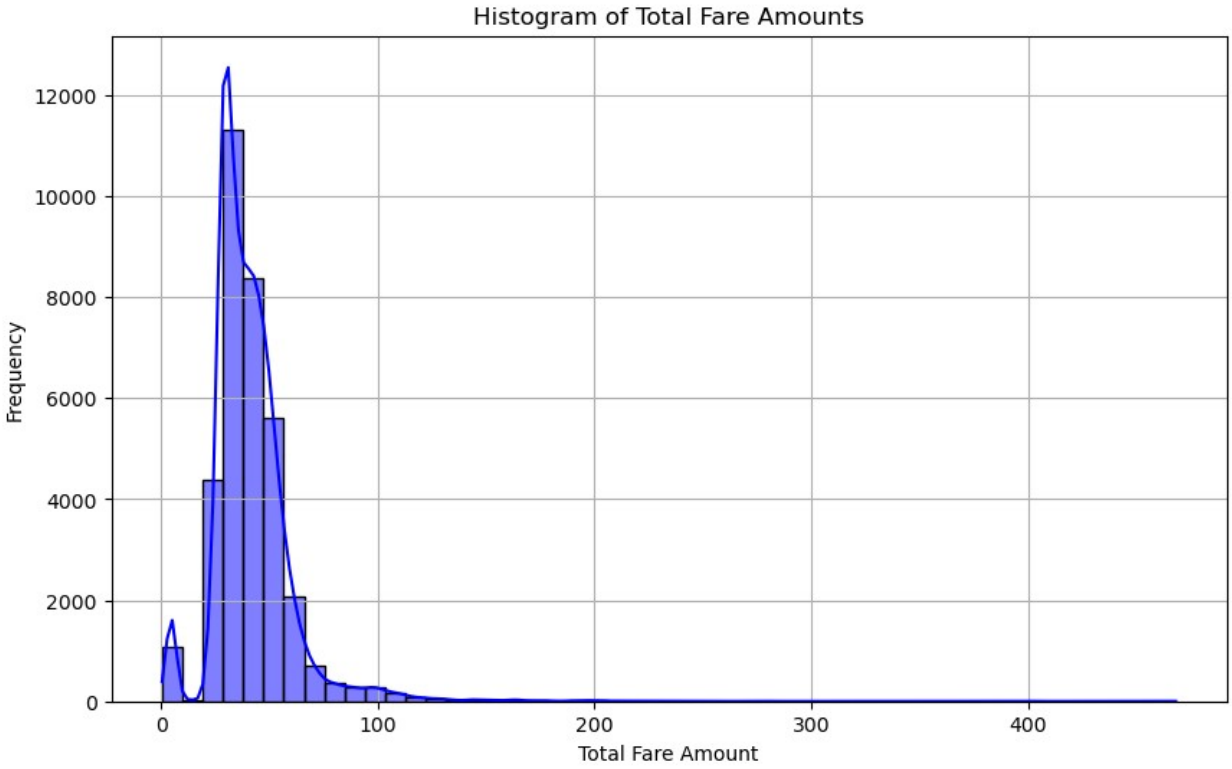
```
   hour_of_day  trip_duration  calculated_total_amount
0            6         2131.0                    24.30
1           10         2377.0                    37.40
2            8         1286.0                    30.36
3           20         2586.0                     4.30
4           21         1575.0                    23.80
```

```
# Convert to datetime
df['datetime'] = pd.to_datetime(df[['year', 'month', 'day']]) +
pd.to_timedelta(df['hour_of_day'], unit='h')

# Set index
df.set_index('datetime', inplace=True)

# Resample to daily total fares
df_daily = df[['total_amount']].resample('D').sum()

## 1. Heatmap (Fare Trends by Hour and Day)
df['day_of_week'] = df.index.dayofweek  # Monday=0, Sunday=6
df['hour'] = df.index.hour
pivot_table = df.pivot_table(values='total_amount',
index='day_of_week', columns='hour', aggfunc=np.sum)
plt.figure(figsize=(12, 6))
sns.heatmap(pivot_table, cmap="coolwarm", annot=False)
plt.xlabel("Hour of Day")
plt.ylabel("Day of Week")
plt.title("Heatmap: Total Fare Amount by Hour and Day")
plt.show()
```

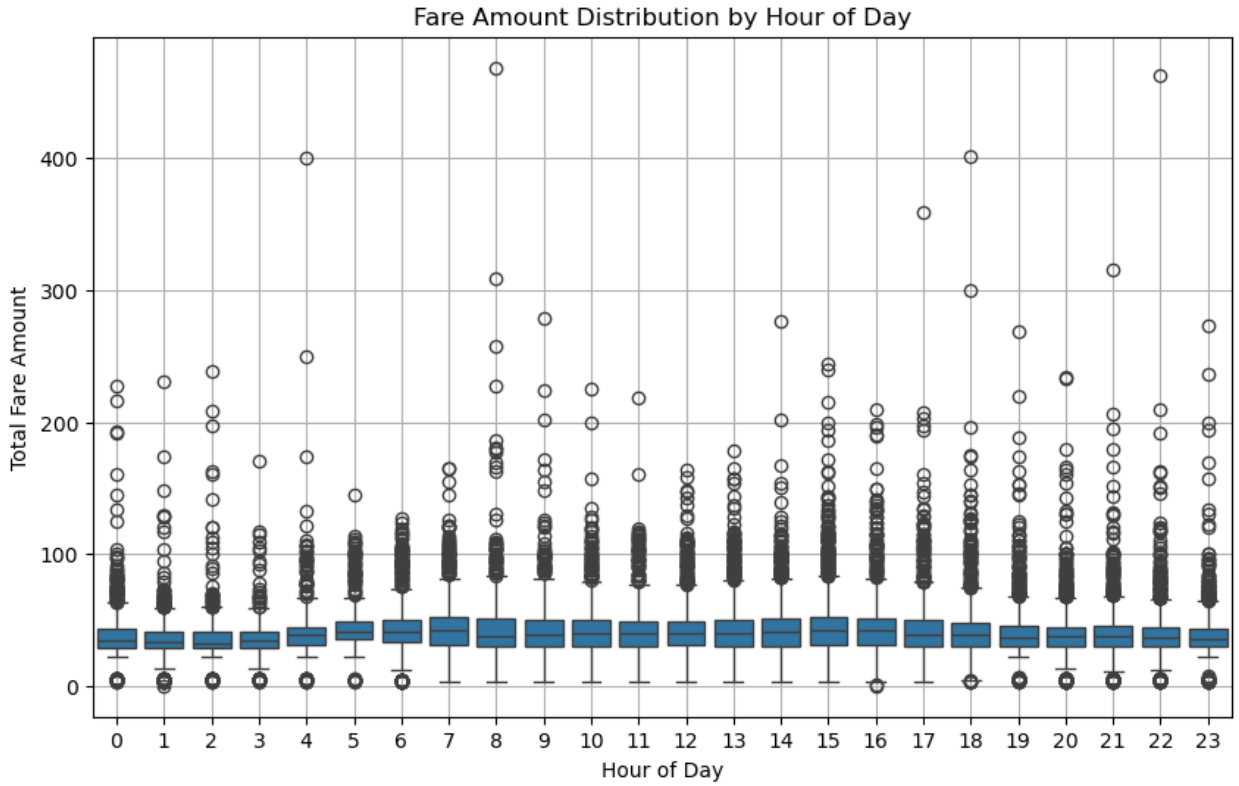
```
C:\Users\HDC0422279\AppData\Local\Temp\ipykernel_4540\1577557542.py:4:
FutureWarning: The provided callable <function sum at
0x000001CB63E9AD40> is currently using DataFrameGroupBy.sum. In a
future version of pandas, the provided callable will be used directly.
To keep current behavior pass the string "sum" instead.
  pivot_table = df.pivot_table(values='total_amount',
index='day_of_week', columns='hour', aggfunc=np.sum)
```




```
## 2. Histogram (Fare Distribution)
plt.figure(figsize=(10, 6))
sns.histplot(df['total_amount'], bins=50, kde=True, color='blue')
plt.xlabel("Total Fare Amount")
plt.ylabel("Frequency")
plt.title("Histogram of Total Fare Amounts")
plt.grid()
plt.show()
```

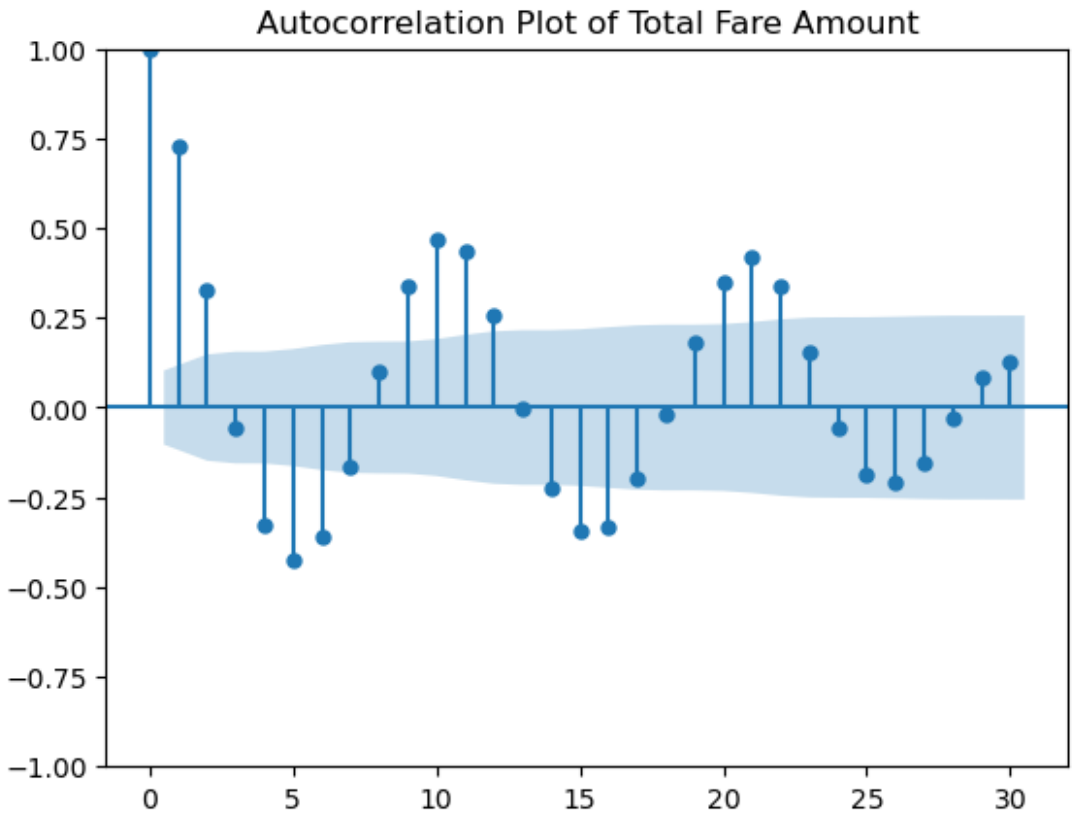



```
# 3. Hourly Fare Distribution (Boxplot)
plt.figure(figsize=(10, 6))
sns.boxplot(x=df['hour_of_day'], y=df['total_amount'])
plt.xlabel("Hour of Day")
plt.ylabel("Total Fare Amount")
plt.title("Fare Amount Distribution by Hour of Day")
plt.grid()
plt.show()
```

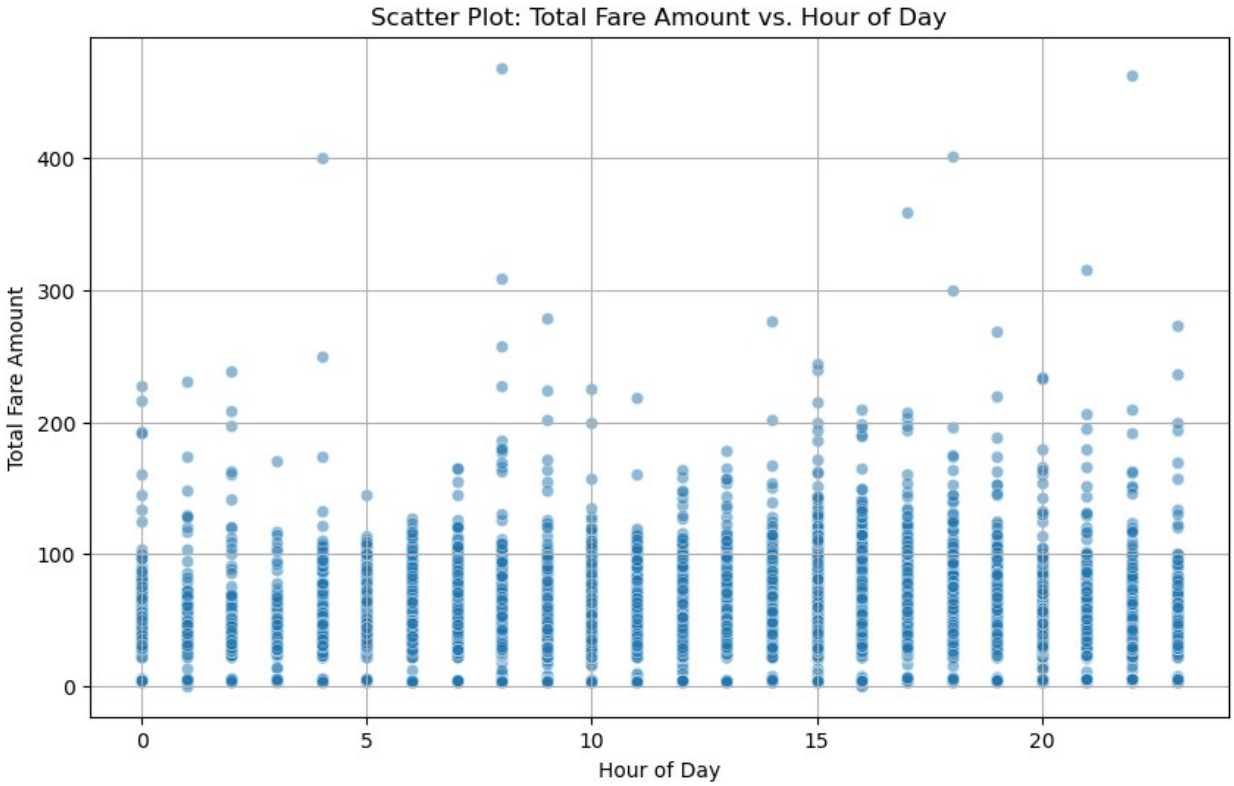



```
## 4. Autocorrelation Plot (ACF)
plt.figure(figsize=(12, 6))
plot_acf(df_daily['total_amount'].dropna(), lags=30)
plt.title("Autocorrelation Plot of Total Fare Amount")
plt.show()
```

```
<Figure size 1200x600 with 0 Axes>
```




```
## 5. Scatter Plot (Fare vs. Hour)
plt.figure(figsize=(10, 6))
sns.scatterplot(x=df['hour_of_day'], y=df['total_amount'], alpha=0.5)
plt.xlabel("Hour of Day")
plt.ylabel("Total Fare Amount")
plt.title("Scatter Plot: Total Fare Amount vs. Hour of Day")
plt.grid()
plt.show()
```


Scatter Plot: Total Fare Amount vs. Hour of Day
Total Fare Amount
Hour of Day
0
100
200
300
400
0
5
10
15
20