Hotel Booking Analysis.

#importing important libraries

```
import pandas as pd
```

Data loading and Cleaning

```
df = pd.read_csv('C:/Users/HIMANSHU/Desktop/Data Analyst
Bootcamp/Assignments/PROJECT PORTFOLIO/Hotel
Bookings/hotel_bookings.csv')
df.head()
```

```
          hotel  is_canceled  lead_time  arrival_date_year
arrival_date_month  \
0  Resort Hotel            0        342               2015
July
1  Resort Hotel            0        737               2015
July
2  Resort Hotel            0          7               2015
July
3  Resort Hotel            0         13               2015
July
4  Resort Hotel            0         14               2015
July

   arrival_date_week_number  arrival_date_day_of_month  \
0                        27                          1
1                        27                          1
2                        27                          1
3                        27                          1
4                        27                          1

   stays_in_weekend_nights  stays_in_week_nights  adults  ...
deposit_type  \
0                        0                     0       2  ...    No
Deposit
1                        0                     0       2  ...    No
Deposit
2                        0                     1       1  ...    No
Deposit
3                        0                     1       1  ...    No
Deposit
4                        0                     2       2  ...    No
Deposit

   agent company days_in_waiting_list customer_type   adr  \
0    NaN     NaN                    0     Transient   0.0
1    NaN     NaN                    0     Transient   0.0
```

```
2    NaN     NaN                     0     Transient  75.0
3  304.0     NaN                     0     Transient  75.0
4  240.0     NaN                     0     Transient  98.0

   required_car_parking_spaces  total_of_special_requests
reservation_status  \
0                            0                          0
Check-Out
1                            0                          0
Check-Out
2                            0                          0
Check-Out
3                            0                          0
Check-Out
4                            0                          1
Check-Out

  reservation_status_date
0                1/7/2015
1                1/7/2015
2                2/7/2015
3                2/7/2015
4                3/7/2015

[5 rows x 32 columns]
```

```
df.drop(['agent','company'], axis = 1,inplace = True)
```

```
df.head()
```

```
          hotel  is_canceled  lead_time  arrival_date_year
arrival_date_month  \
0  Resort Hotel            0        342               2015
July
1  Resort Hotel            0        737               2015
July
2  Resort Hotel            0          7               2015
July
3  Resort Hotel            0         13               2015
July
4  Resort Hotel            0         14               2015
July

   arrival_date_week_number  arrival_date_day_of_month  \
0                        27                          1
1                        27                          1
2                        27                          1
3                        27                          1
4                        27                          1
```

```
   stays_in_weekend_nights  stays_in_week_nights  adults  ...  \
0                        0                     0       2  ...
1                        0                     0       2  ...
2                        0                     1       1  ...
3                        0                     1       1  ...
4                        0                     2       2  ...

   assigned_room_type  booking_changes deposit_type
days_in_waiting_list  \
0                   C                3   No Deposit
0
1                   C                4   No Deposit
0
2                   C                0   No Deposit
0
3                   A                0   No Deposit
0
4                   A                0   No Deposit
0

  customer_type   adr  required_car_parking_spaces
total_of_special_requests  \
0     Transient   0.0                           0
0
1     Transient   0.0                           0
0
2     Transient  75.0                           0
0
3     Transient  75.0                           0
0
4     Transient  98.0                           0
1

   reservation_status reservation_status_date
0           Check-Out                1/7/2015
1           Check-Out                1/7/2015
2           Check-Out                2/7/2015
3           Check-Out                2/7/2015
4           Check-Out                3/7/2015

[5 rows x 30 columns]
```

Booking Trends Analysis:

Q1. What is the overall cancellation rate?

```
cancellation_rate = df['is_canceled'].mean()
print(f"Overall cancellation rate: {cancellation_rate:.2%}")

Overall cancellation rate: 37.04%
```

Q2.How do cancellations vary between Resort and City hotels?

```
cancellation_rates = (df.groupby('hotel')
['is_canceled'].mean()*100).round(2)
print(cancellation_rates)
```

```
hotel
City Hotel      41.73
Resort Hotel    27.76
Name: is_canceled, dtype: float64
```

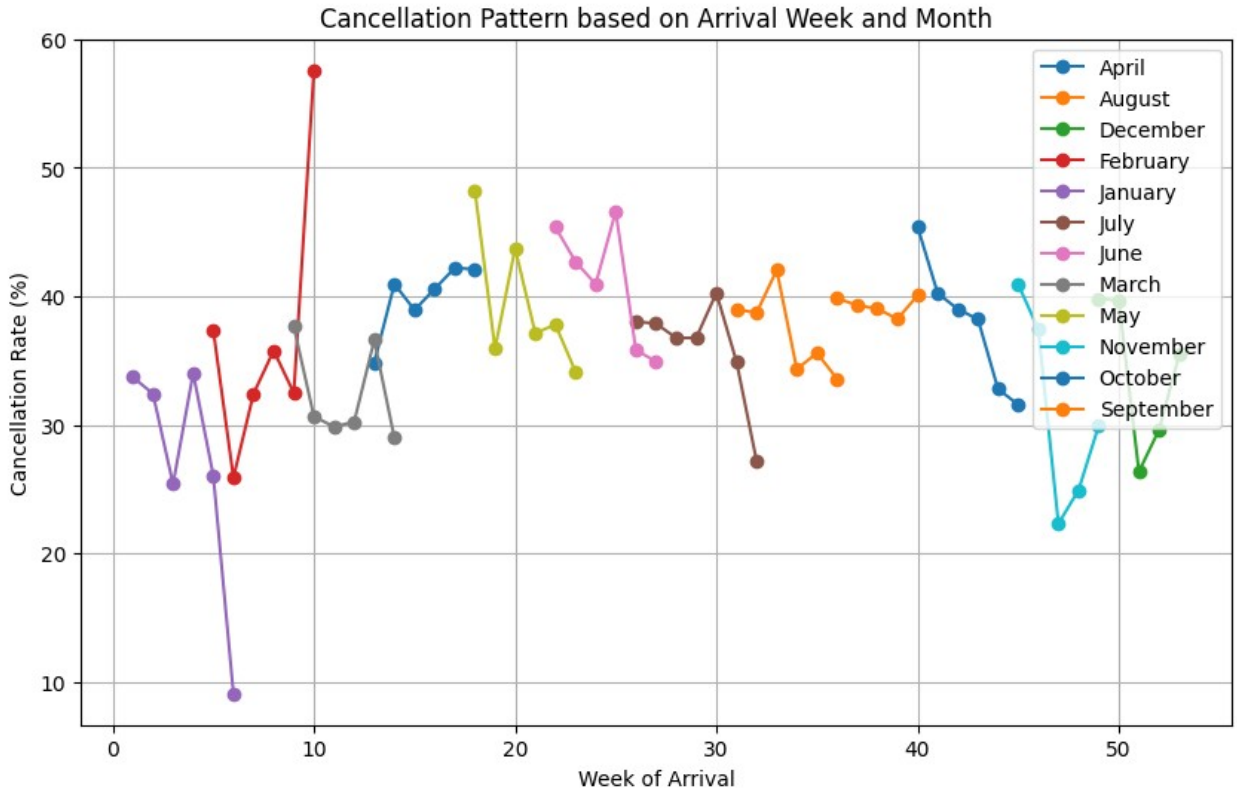
Q3. Are there any patterns in cancellation rates based on the month or week number of arrival?

```
cancellation_pattern = df.groupby(['arrival_date_month',
'arrival_date_week_number'])['is_canceled'].mean() * 100
print(cancellation_pattern)
```

```
arrival_date_month  arrival_date_week_number
April               13                         34.848485
                    14                         40.967962
                    15                         38.936408
                    16                         40.582121
                    17                         42.210339
                                                  ...
September           36                         39.852941
                    37                         39.300135
                    38                         39.045472
                    39                         38.240992
                    40                         40.071556
Name: is_canceled, Length: 70, dtype: float64
```

```
import matplotlib.pyplot as plt
cancellation_pattern = cancellation_pattern.reset_index()

# Create a line plot
plt.figure(figsize=(10, 6))
for month in cancellation_pattern['arrival_date_month'].unique():
    monthly_data =
cancellation_pattern[cancellation_pattern['arrival_date_month'] ==
month]
    plt.plot(
        monthly_data['arrival_date_week_number'],
        monthly_data['is_canceled'],
        marker='o',
        label=month
    )

plt.xlabel('Week of Arrival')
plt.ylabel('Cancellation Rate (%)')
```

```
plt.title('Cancellation Pattern based on Arrival Week and Month')
plt.legend()
plt.grid(True)

plt.show()
```



Guest Behavior Analysis:

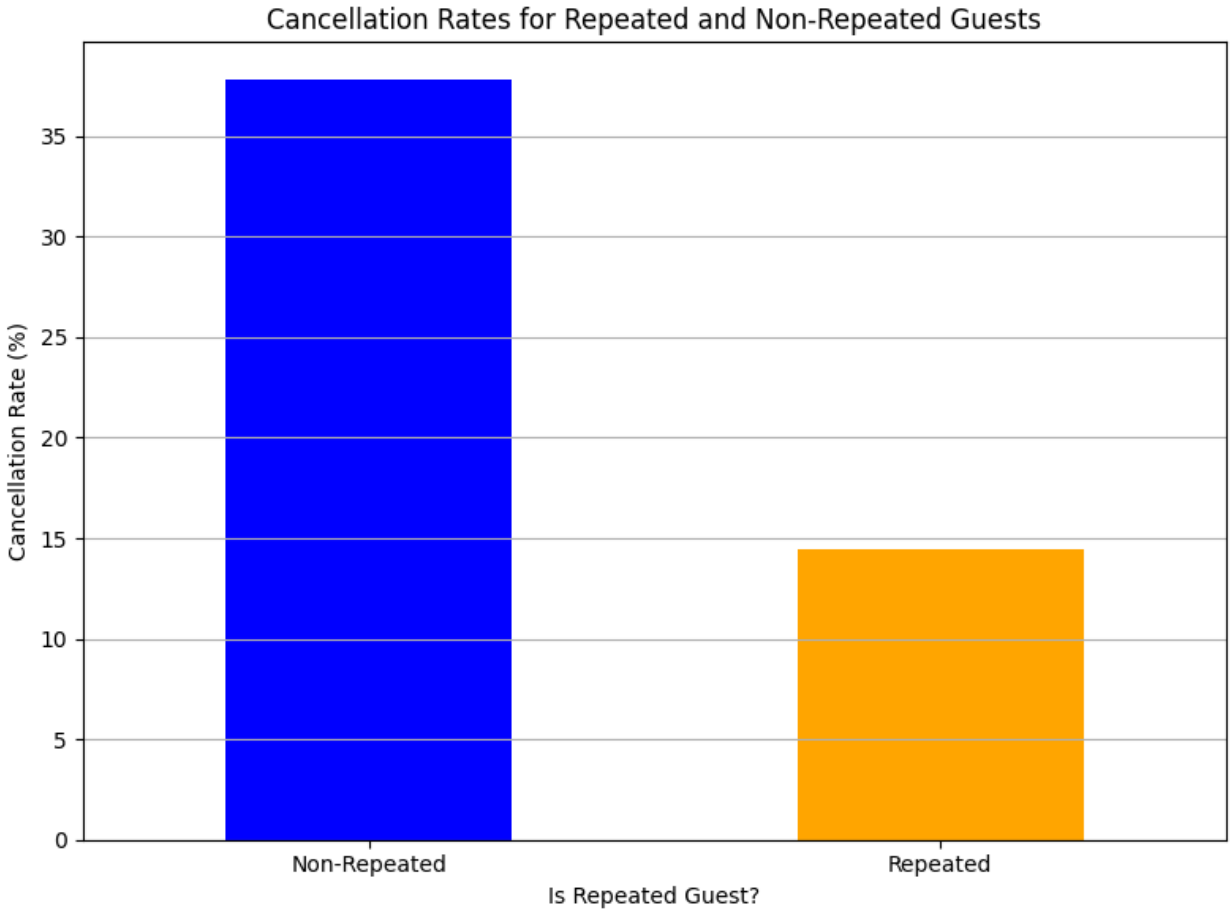
Q. What's the average lead time for bookings?

```
Average_lead_time = (df['lead_time'].mean()).round(0)
print(Average_lead_time)

104.0
```

Q. Do repeated guests tend to cancel less?

```
cancellation_rates = df.groupby('is_repeated_guest')
['is_canceled'].mean() * 100

# Create a bar plot
plt.figure(figsize=(8, 6))
cancellation_rates.plot(kind='bar', color=['blue', 'orange'])
plt.xlabel('Is Repeated Guest?')
plt.ylabel('Cancellation Rate (%)')
```

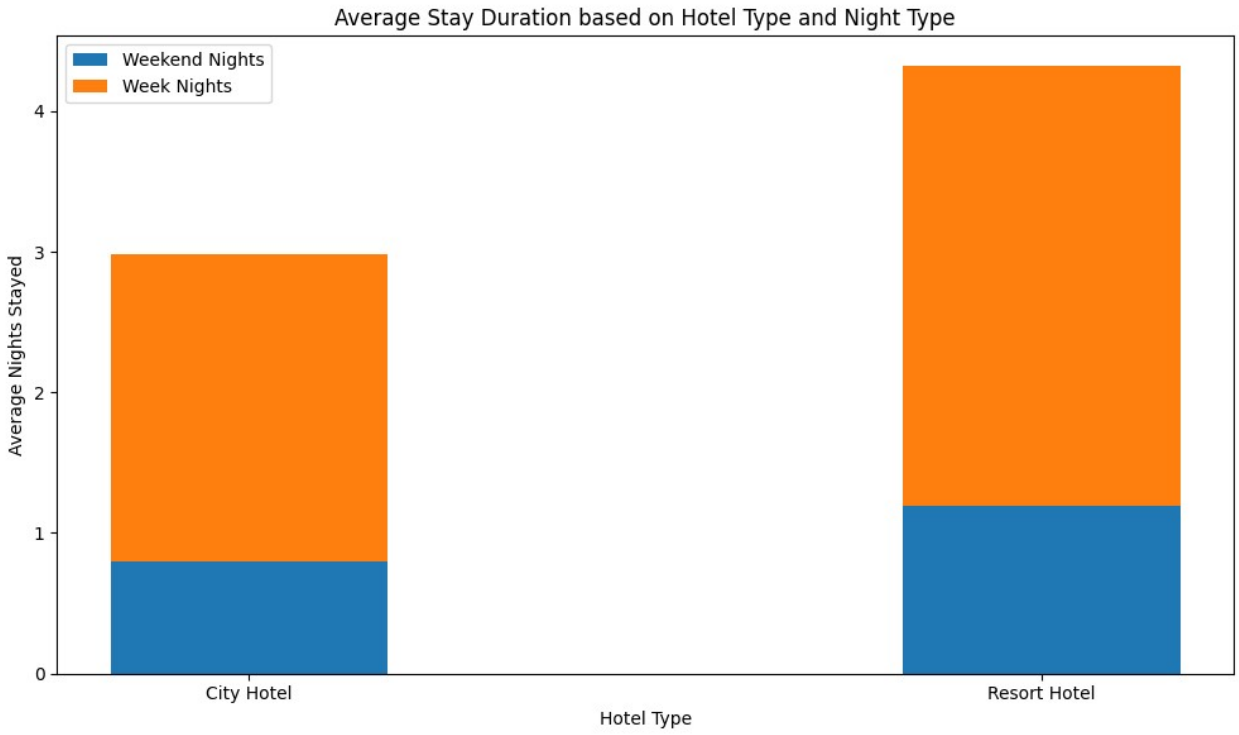
```
plt.title('Cancellation Rates for Repeated and Non-Repeated Guests')
plt.xticks(ticks=[0, 1], labels=['Non-Repeated', 'Repeated'],
rotation=0)
plt.grid(axis='y')
plt.tight_layout()
plt.show()
```



Q. Are there differences in booking patterns (weekend vs. weeknights) based on hotel type?

```
# Calculate average stays for weekend nights and weeknights based on
hotel type
avg_stays = df.groupby('hotel')[['stays_in_weekend_nights',
'stays_in_week_nights']].mean()

# Plotting the grouped bar plot
fig, ax = plt.subplots(figsize=(10, 6))

bar_width = 0.35
index = avg_stays.index
labels = avg_stays.columns
```

```
weekend_nights = avg_stays['stays_in_weekend_nights']
week_nights = avg_stays['stays_in_week_nights']

bar1 = ax.bar(index, weekend_nights, bar_width, label='Weekend
Nights')
bar2 = ax.bar(index, week_nights, bar_width, bottom=weekend_nights,
label='Week Nights')

ax.set_xlabel('Hotel Type')
ax.set_ylabel('Average Nights Stayed')
ax.set_title('Average Stay Duration based on Hotel Type and Night
Type')
ax.set_xticks(index)
ax.set_xticklabels(index)
ax.legend()

plt.tight_layout()
plt.show()
```

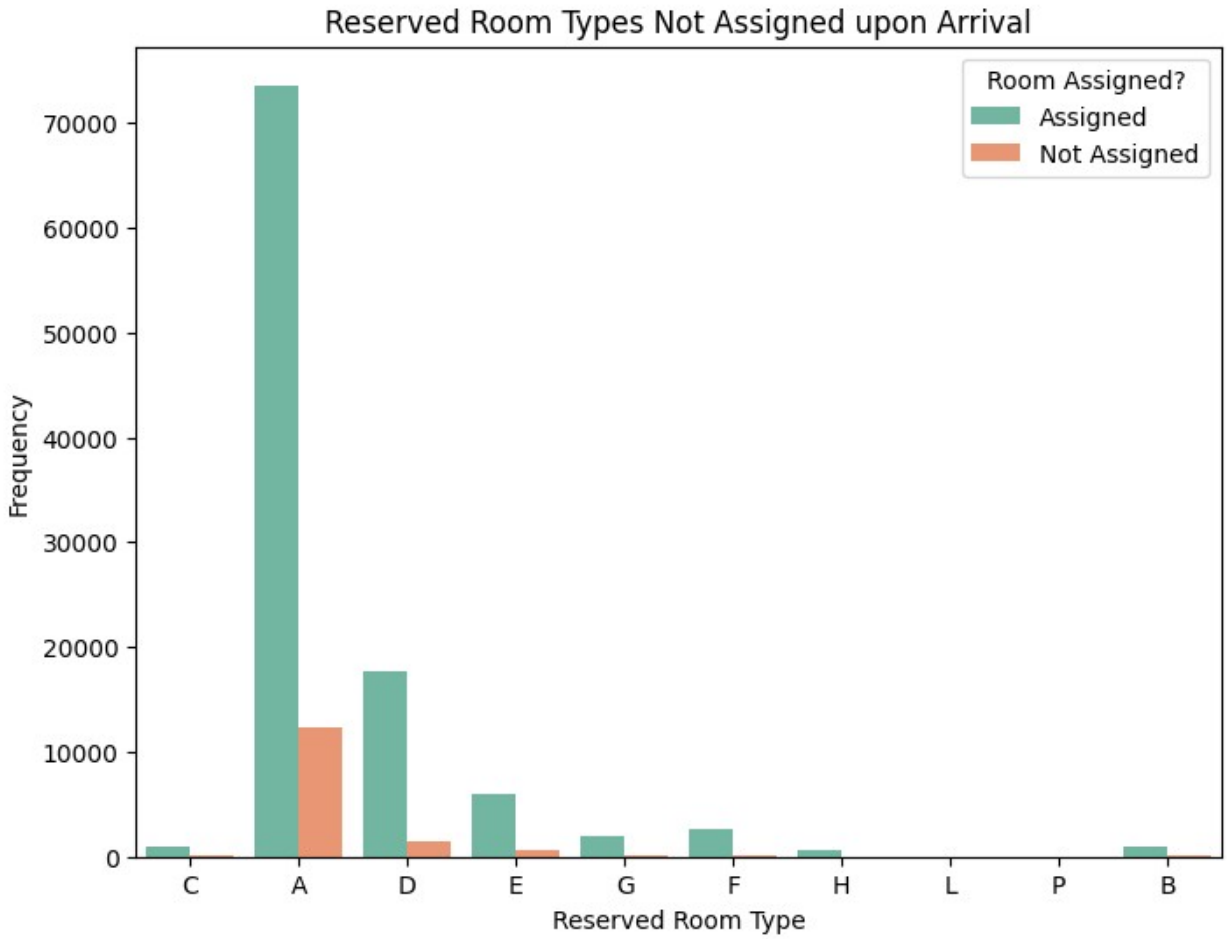


Room and Reservation Analysis:

Q. How often are room types reserved but not assigned upon arrival?

```
import seaborn as sns
# Check where reserved room types are not assigned upon arrival
df['not_assigned'] = df['reserved_room_type'] !=
```

```
df['assigned_room_type']

# Count the occurrences of reserved room types not being assigned
not_assigned_count = df['not_assigned'].sum()

# Calculate the percentage of cases where room types are reserved but
not assigned
total_entries = len(df)
percentage_not_assigned = (not_assigned_count / total_entries) * 100

# Create a count plot to visualize reserved room types not assigned
upon arrival
plt.figure(figsize=(8, 6))
sns.countplot(x='reserved_room_type', hue='not_assigned', data=df,
palette='Set2')
plt.xlabel('Reserved Room Type')
plt.ylabel('Frequency')
plt.title('Reserved Room Types Not Assigned upon Arrival')
plt.legend(['Assigned', 'Not Assigned'], title='Room Assigned?')
plt.show()

print(f"Percentage of reserved room types not assigned:
{percentage_not_assigned:.2f}%")
```

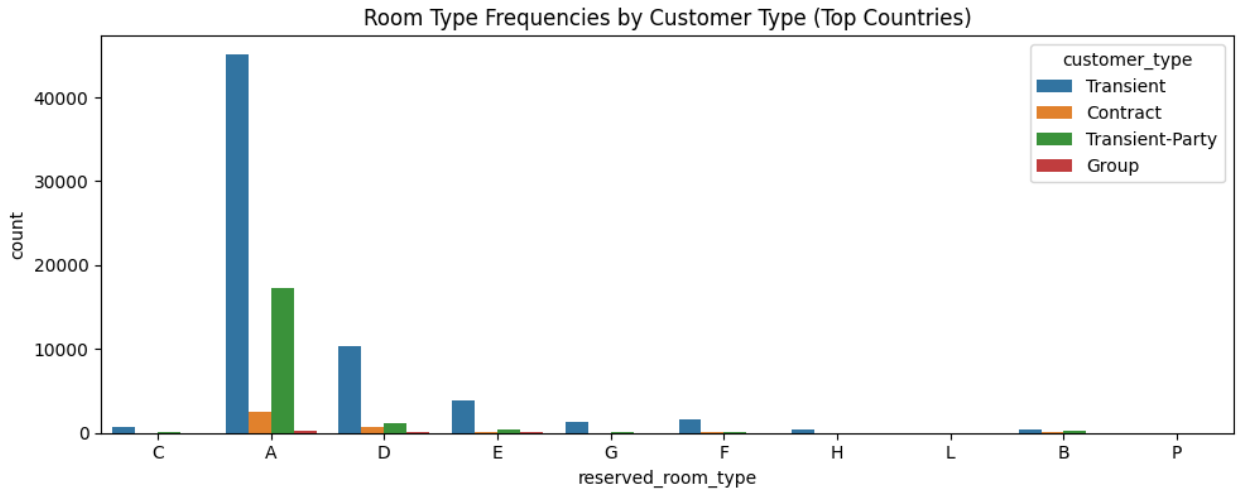


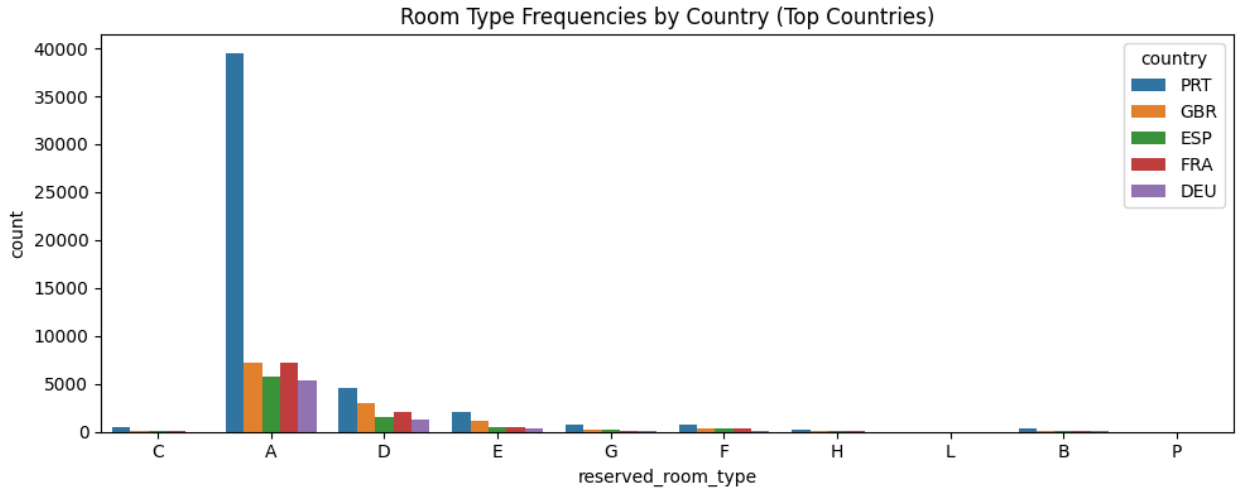

```
Percentage of reserved room types not assigned: 12.49%
```

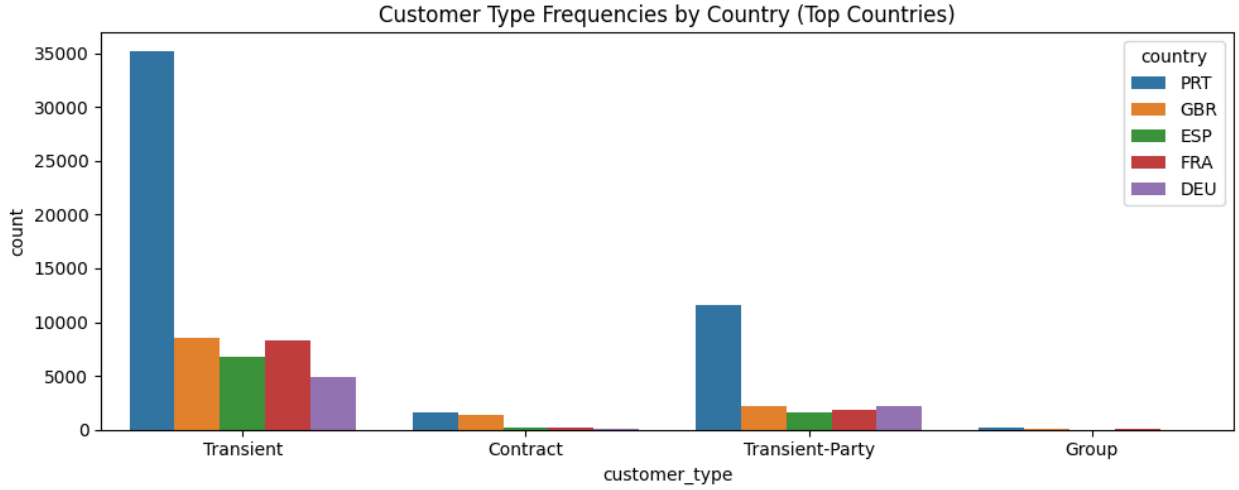
Q. Are there particular room types more commonly booked by different customer types or countries?

```
# Get the top N countries with the most bookings
top_countries =
df['country'].value_counts().nlargest(5).index.tolist()  # Change 3 to
the desired number of countries

# Filter the DataFrame for the top countries
df_top_countries = df[df['country'].isin(top_countries)]

# Create count plots for each category based on the top countries
fig, axes = plt.subplots(3, 1, figsize=(10, 12))

sns.countplot(x='reserved_room_type', hue='customer_type',
data=df_top_countries, ax=axes[0])
axes[0].set_title('Room Type Frequencies by Customer Type (Top
Countries)')
```

```
sns.countplot(x='reserved_room_type', hue='country',
data=df_top_countries, ax=axes[1])
axes[1].set_title('Room Type Frequencies by Country (Top Countries)')

sns.countplot(x='customer_type', hue='country', data=df_top_countries,
ax=axes[2])
axes[2].set_title('Customer Type Frequencies by Country (Top
Countries)')

plt.tight_layout()
plt.show()
```







Financial Insights:

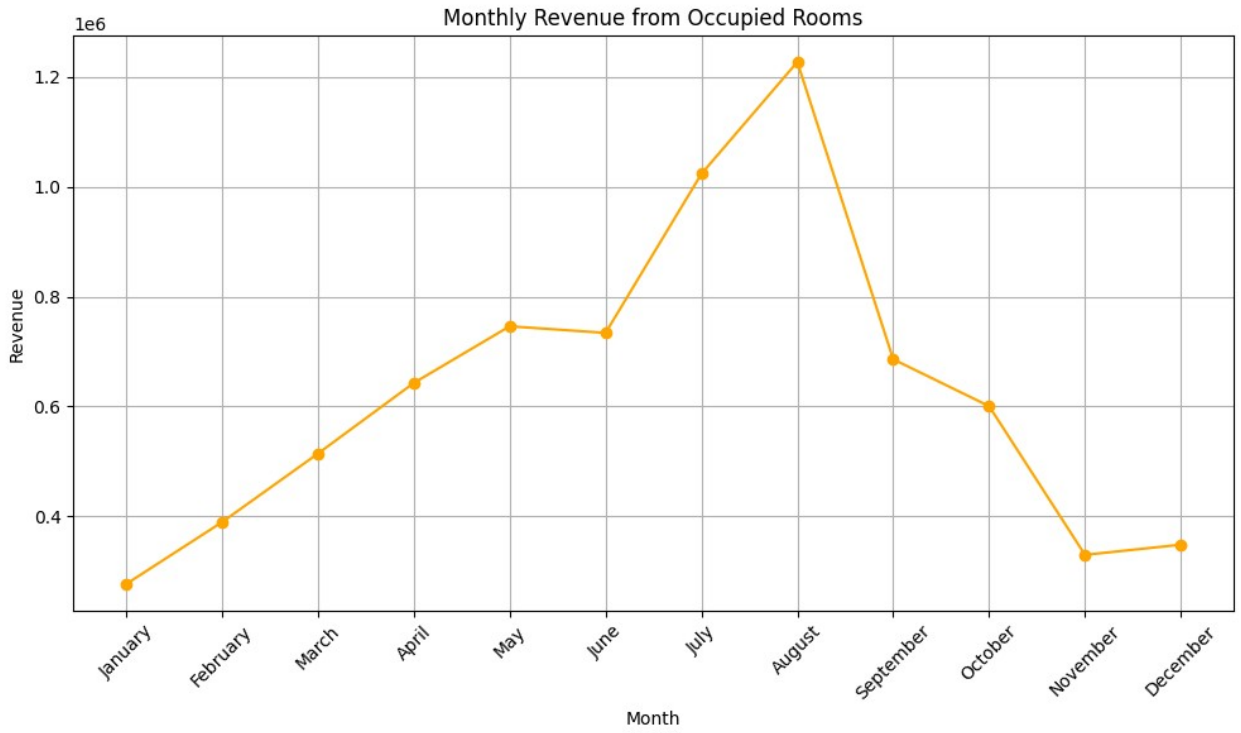
Q What's the average daily rate (ADR) for different hotel types?

```
average_Adr_by_type = (df.groupby('hotel')['adr'].mean()).round(2)
print(average_Adr_by_type)
```

```
hotel
City Hotel      105.30
Resort Hotel     94.95
Name: adr, dtype: float64
```

Q. Are there seasonal trends in ADR or revenue generation?

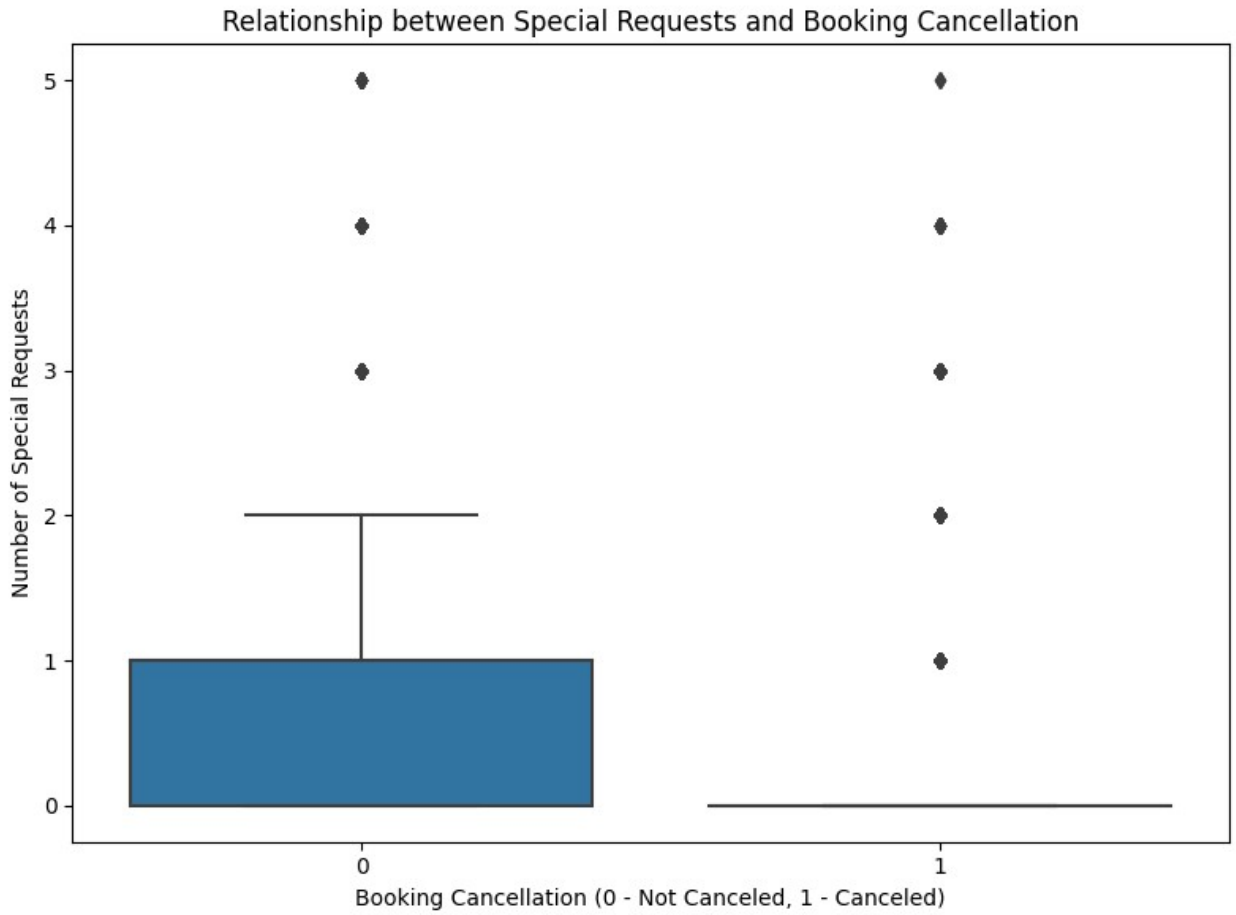
```
# Sort months chronologically (if needed)
month_order = ['January', 'February', 'March', 'April', 'May', 'June',
'July', 'August', 'September', 'October', 'November', 'December']
df['arrival_date_month'] = pd.Categorical(df['arrival_date_month'],
categories=month_order, ordered=True)
df = df.sort_values('arrival_date_month')

# Filter data for occupied rooms (is_canceled = 0)
occupied_rooms = df[df['is_canceled'] == 0]

# Calculate revenue for each month (ADR * Number of occupied rooms)
revenue_per_month = occupied_rooms.groupby('arrival_date_month')
['adr'].sum()

# Create a line chart for revenue by month
plt.figure(figsize=(10, 6))
plt.plot(revenue_per_month.index, revenue_per_month.values,
marker='o', color='orange', linestyle='-')
plt.xlabel('Month')
plt.ylabel('Revenue')
plt.title('Monthly Revenue from Occupied Rooms')
plt.xticks(rotation=45)
plt.grid(True)
plt.tight_layout()
plt.show()
```



Special Requests and Services:

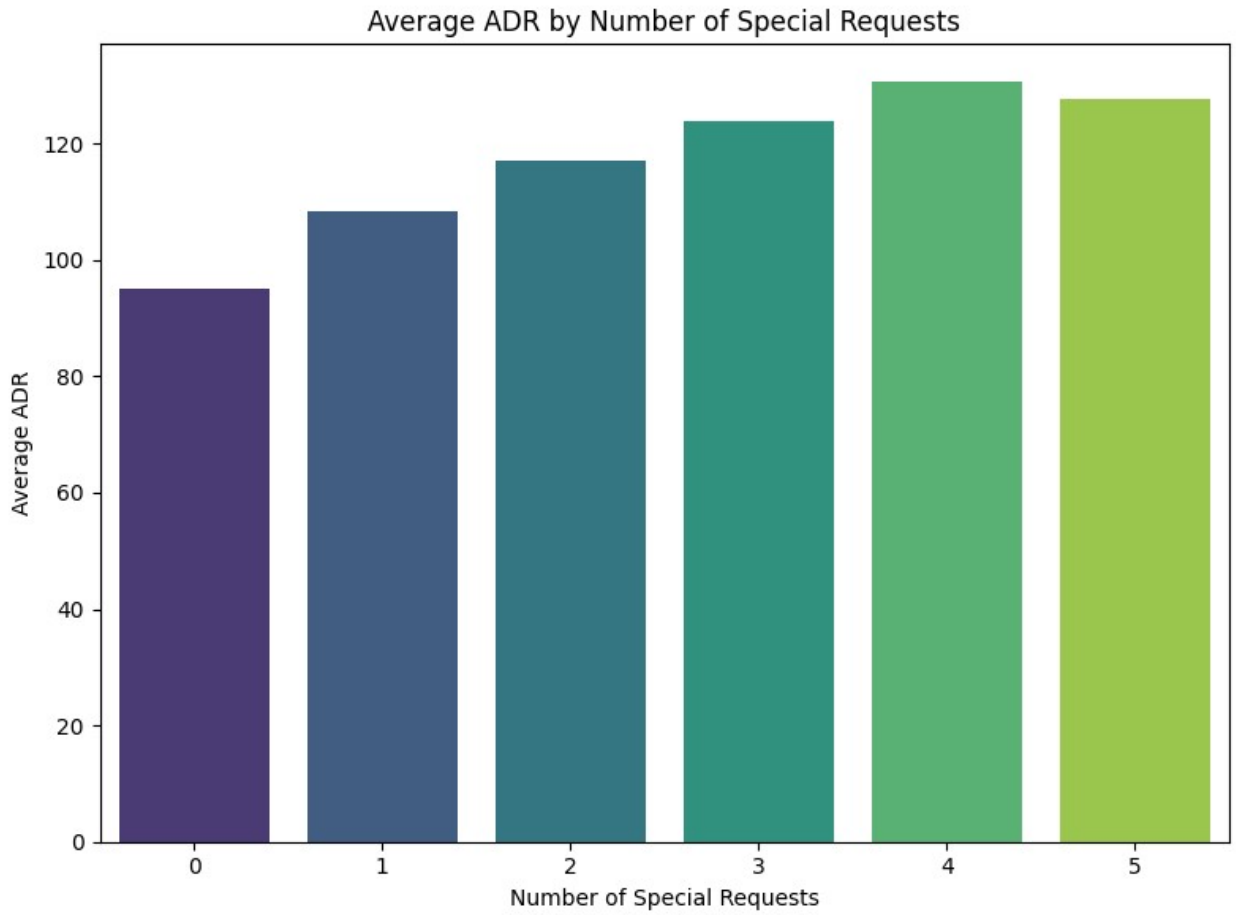
Q. How does the number of special requests correlate with the booking's cancellation?

```
# Create a box plot to visualize the relationship between special
requests and booking cancellation
plt.figure(figsize=(8, 6))
sns.boxplot(x='is_canceled', y='total_of_special_requests', data=df)
plt.xlabel('Booking Cancellation (0 - Not Canceled, 1 - Canceled)')
plt.ylabel('Number of Special Requests')
plt.title('Relationship between Special Requests and Booking
Cancellation')
plt.tight_layout()
plt.show()
```



Q. Do guests with more special requests tend to leave higher ADR?

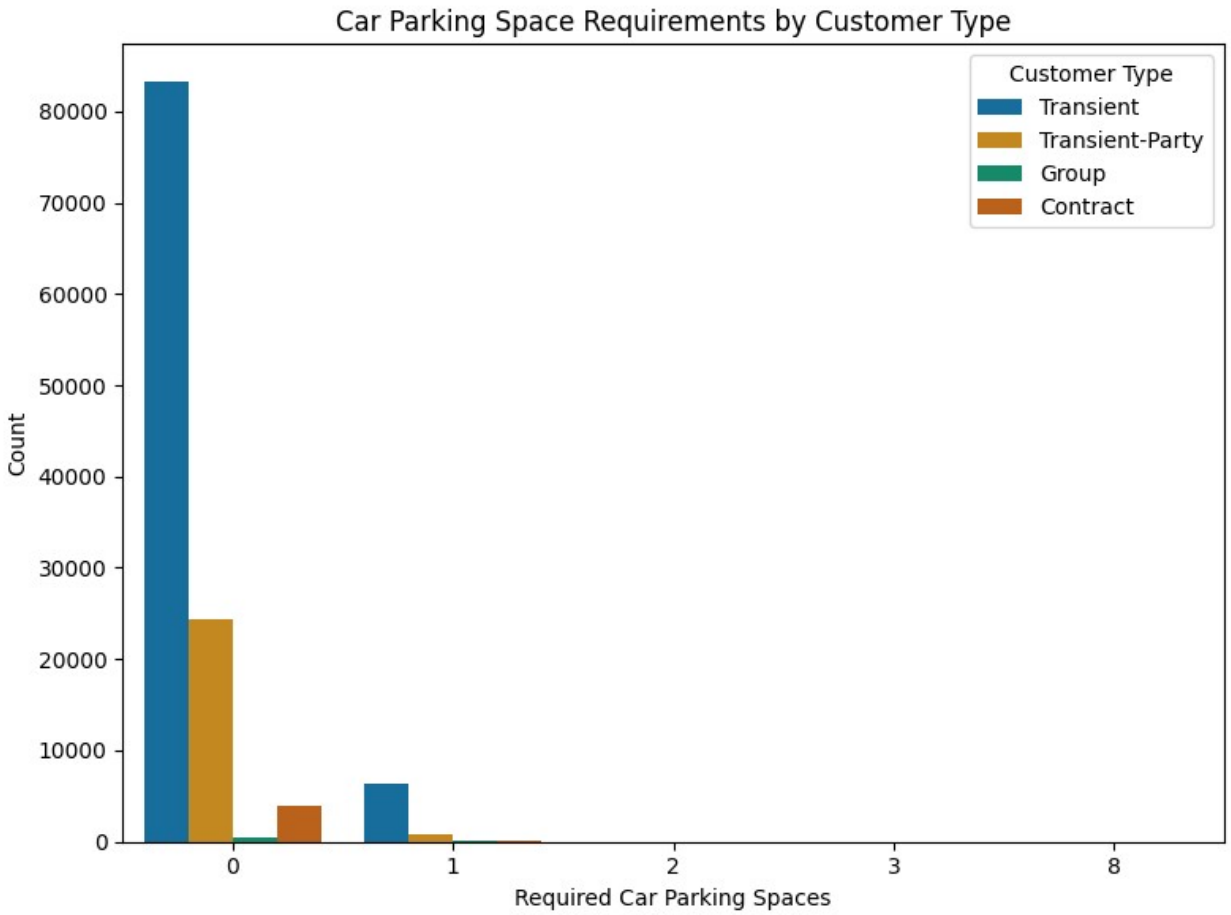
```
# Calculate the average ADR for each number of special requests
avg_adr_per_request = df.groupby('total_of_special_requests')
['adr'].mean().reset_index()

# Create a bar plot to compare the average ADR with the number of
special requests
plt.figure(figsize=(8, 6))
sns.barplot(x='total_of_special_requests', y='adr',
data=avg_adr_per_request, palette='viridis')
plt.xlabel('Number of Special Requests')
plt.ylabel('Average ADR')
plt.title('Average ADR by Number of Special Requests')
plt.tight_layout()
plt.show()
```



Parking Spaces and Customer Preferences:

Q. What's the demand for car parking spaces, and does it relate to other booking details or customer types?

```
# Create a count plot to visualize car parking space requirements by
customer type
plt.figure(figsize=(8, 6))
sns.countplot(x='required_car_parking_spaces', hue='customer_type',
data=df, palette='colorblind')
plt.xlabel('Required Car Parking Spaces')
plt.ylabel('Count')
plt.title('Car Parking Space Requirements by Customer Type')
plt.legend(title='Customer Type')
plt.tight_layout()
plt.show()
```


Car Parking Space Requirements by Customer Type
Customer Type
Transient
Transient-Party
Group
Contract
Count
80000
70000
60000
50000
40000
30000
20000
10000
0
0
1
2
3
8
Required Car Parking Spaces