```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
!unzip '/content/drive/MyDrive/Colab Notebooks/archive (1).zip'
```

```
Archive:  /content/drive/MyDrive/Colab Notebooks/archive (1).zip
  inflating: hotel_booking.csv
```

Importing Libraries:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

```
df = pd.read_csv('/content/hotel_booking.csv')
```

EXPLORATORY DATA ANALYSIS AND DATA CLEANING

```
df.head()
```

	hotel	is_canceled	lead_time	arrival_date_year	arrival_date_month	arrival_date_week_number	arri
0	Resort Hotel	0	342	2015	July	27	
1	Resort Hotel	0	737	2015	July	27	
2	Resort Hotel	0	7	2015	July	27	
3	Resort Hotel	0	13	2015	July	27	
4	Resort Hotel	0	14	2015	July	27	

5 rows × 36 columns

```
df.tail(10)
```

	hotel	is_canceled	lead_time	arrival_date_year	arrival_date_month	arrival_date_week_number
119380	City Hotel	0	44	2017	August	35
119381	City Hotel	0	188	2017	August	35
119382	City Hotel	0	135	2017	August	35
119383	City Hotel	0	164	2017	August	35
119384	City Hotel	0	21	2017	August	35
119385	City Hotel	0	23	2017	August	35

```
df.shape
```

```
(119390, 36)
```

119387	City Hotel	0	34	2017	August	35

```
df.columns
```

```
Index(['hotel', 'is_canceled', 'lead_time', 'arrival_date_year',
       'arrival_date_month', 'arrival_date_week_number',
       'arrival_date_day_of_month', 'stays_in_weekend_nights',
       'stays_in_week_nights', 'adults', 'children', 'babies', 'meal',
       'country', 'market_segment', 'distribution_channel',
       'is_repeated_guest', 'previous_cancellations',
       'previous_bookings_not_canceled', 'reserved_room_type',
       'assigned_room_type', 'booking_changes', 'deposit_type', 'agent',
       'company', 'days_in_waiting_list', 'customer_type', 'adr',
       'required_car_parking_spaces', 'total_of_special_requests',
       'reservation_status', 'reservation_status_date', 'name', 'email',
       'phone-number', 'credit_card'],
      dtype='object')
```

```
#DROP COLUMNS
df = df.drop(columns=['name', 'email','phone-number', 'credit_card'])
```

```
df.columns
```

```
Index(['hotel', 'is_canceled', 'lead_time', 'arrival_date_year',
       'arrival_date_month', 'arrival_date_week_number',
       'arrival_date_day_of_month', 'stays_in_weekend_nights',
       'stays_in_week_nights', 'adults', 'children', 'babies', 'meal',
       'country', 'market_segment', 'distribution_channel',
       'is_repeated_guest', 'previous_cancellations',
       'previous_bookings_not_canceled', 'reserved_room_type',
       'assigned_room_type', 'booking_changes', 'deposit_type', 'agent',
       'company', 'days_in_waiting_list', 'customer_type', 'adr',
       'required_car_parking_spaces', 'total_of_special_requests',
       'reservation_status', 'reservation_status_date'],
      dtype='object')
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 119390 entries, 0 to 119389
Data columns (total 32 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   hotel                           119390 non-null  object
 1   is_canceled                     119390 non-null  int64
 2   lead_time                       119390 non-null  int64
 3   arrival_date_year               119390 non-null  int64
 4   arrival_date_month              119390 non-null  object
 5   arrival_date_week_number        119390 non-null  int64
 6   arrival_date_day_of_month       119390 non-null  int64
```

```
 7   stays_in_weekend_nights         119390 non-null  int64
 8   stays_in_week_nights            119390 non-null  int64
 9   adults                          119390 non-null  int64
 10  children                        119386 non-null  float64
 11  babies                          119390 non-null  int64
 12  meal                            119390 non-null  object
 13  country                         118902 non-null  object
 14  market_segment                  119390 non-null  object
 15  distribution_channel            119390 non-null  object
 16  is_repeated_guest               119390 non-null  int64
 17  previous_cancellations          119390 non-null  int64
 18  previous_bookings_not_canceled  119390 non-null  int64
 19  reserved_room_type              119390 non-null  object
 20  assigned_room_type              119390 non-null  object
 21  booking_changes                 119390 non-null  int64
 22  deposit_type                    119390 non-null  object
 23  agent                           103050 non-null  float64
 24  company                         6797 non-null    float64
 25  days_in_waiting_list            119390 non-null  int64
 26  customer_type                   119390 non-null  object
 27  adr                             119390 non-null  float64
 28  required_car_parking_spaces     119390 non-null  int64
 29  total_of_special_requests       119390 non-null  int64
 30  reservation_status              119390 non-null  object
 31  reservation_status_date         119390 non-null  object
dtypes: float64(4), int64(16), object(12)
memory usage: 29.1+ MB
```

```
df['reservation_status_date']= pd.to_datetime(df['reservation_status_date'])
```

```
df.describe(include = 'object')
```

	hotel	arrival_date_month	meal	country	market_segment	distribution_channel	reserved_roo
count	119390	119390	119390	118902	119390	119390	
unique	2	12	5	177	8	5	
top	City Hotel	August	BB	PRT	Online TA	TA/TO	
freq	79330	13877	92310	48590	56477	97870	

```
for col in df.describe(include = 'object').columns :
  print(col)
  print(df[col].unique())
  print('-'*50)        #separete column
```

```
hotel
['Resort Hotel' 'City Hotel']
--------------------------------------------------
arrival_date_month
['July' 'August' 'September' 'October' 'November' 'December' 'January'
 'February' 'March' 'April' 'May' 'June']
--------------------------------------------------
meal
['BB' 'FB' 'HB' 'SC' 'Undefined']
--------------------------------------------------
country
['PRT' 'GBR' 'USA' 'ESP' 'IRL' 'FRA' nan 'ROU' 'NOR' 'OMN' 'ARG' 'POL'
 'DEU' 'BEL' 'CHE' 'CN' 'GRC' 'ITA' 'NLD' 'DNK' 'RUS' 'SWE' 'AUS' 'EST'
 'CZE' 'BRA' 'FIN' 'MOZ' 'BWA' 'LUX' 'SVN' 'ALB' 'IND' 'CHN' 'MEX' 'MAR'
 'UKR' 'SMR' 'LVA' 'PRI' 'SRB' 'CHL' 'AUT' 'BLR' 'LTU' 'TUR' 'ZAF' 'AGO'
 'ISR' 'CYM' 'ZMB' 'CPV' 'ZWE' 'DZA' 'KOR' 'CRI' 'HUN' 'ARE' 'TUN' 'JAM'
 'HRV' 'HKG' 'IRN' 'GEO' 'AND' 'GIB' 'URY' 'JEY' 'CAF' 'CYP' 'COL' 'GGY'
 'KWT' 'NGA' 'MDV' 'VEN' 'SVK' 'FJI' 'KAZ' 'PAK' 'IDN' 'LBN' 'PHL' 'SEN'
 'SYC' 'AZE' 'BHR' 'NZL' 'THA' 'DOM' 'MKD' 'MYS' 'ARM' 'JPN' 'LKA' 'CUB'
 'CMR' 'BIH' 'MUS' 'COM' 'SUR' 'UGA' 'BGR' 'CIV' 'JOR' 'SYR' 'SGP' 'BDI'
 'SAU' 'VNM' 'PLW' 'QAT' 'EGY' 'PER' 'MLT' 'MWI' 'ECU' 'MDG' 'ISL' 'UZB'
 'NPL' 'BHS' 'MAC' 'TGO' 'TWN' 'DJI' 'STP' 'KNA' 'ETH' 'IRQ' 'HND' 'RWA'
 'KHM' 'MCO' 'BGD' 'IMN' 'TJK' 'NIC' 'BEN' 'VGB' 'TZA' 'GAB' 'GHA' 'TMP'
 'GLP' 'KEN' 'LIE' 'GNB' 'MNE' 'UMI' 'MYT' 'FRO' 'MMR' 'PAN' 'BFA' 'LBY'
 'MLI' 'NAM' 'BOL' 'PRY' 'BRB' 'ABW' 'AIA' 'SLV' 'DMA' 'PYF' 'GUY' 'LCA'
 'ATA' 'GTM' 'ASM' 'MRT' 'NCL' 'KIR' 'SDN' 'ATF' 'SLE' 'LAO']
--------------------------------------------------
market_segment
['Direct' 'Corporate' 'Online TA' 'Offline TA/TO' 'Complementary' 'Groups'
 'Undefined' 'Aviation']
--------------------------------------------------
distribution_channel
['Direct' 'Corporate' 'TA/TO' 'Undefined' 'GDS']
--------------------------------------------------
```

```
reserved_room_type
['C' 'A' 'D' 'E' 'G' 'F' 'H' 'L' 'P' 'B']
--------------------------------------------------
assigned_room_type
['C' 'A' 'D' 'E' 'G' 'F' 'I' 'B' 'H' 'P' 'L' 'K']
--------------------------------------------------
deposit_type
['No Deposit' 'Refundable' 'Non Refund']
--------------------------------------------------
customer_type
['Transient' 'Contract' 'Transient-Party' 'Group']
--------------------------------------------------
reservation_status
['Check-Out' 'Canceled' 'No-Show']
--------------------------------------------------
```

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

```
hotel                               0
is_canceled                         0
lead_time                           0
arrival_date_year                   0
arrival_date_month                  0
arrival_date_week_number            0
arrival_date_day_of_month           0
stays_in_weekend_nights             0
stays_in_week_nights                0
adults                              0
children                            4
babies                              0
meal                                0
country                           488
market_segment                      0
distribution_channel                0
is_repeated_guest                   0
previous_cancellations              0
previous_bookings_not_canceled      0
reserved_room_type                  0
assigned_room_type                  0
booking_changes                     0
deposit_type                        0
agent                           16340
company                        112593
days_in_waiting_list                0
customer_type                       0
adr                                 0
required_car_parking_spaces         0
total_of_special_requests           0
reservation_status                  0
reservation_status_date             0
dtype: int64
```

```
df = df.drop(columns=['agent', 'company'])
```

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

```
hotel                               0
is_canceled                         0
lead_time                           0
arrival_date_year                   0
arrival_date_month                  0
arrival_date_week_number            0
arrival_date_day_of_month           0
stays_in_weekend_nights             0
stays_in_week_nights                0
adults                              0
children                            4
babies                              0
meal                                0
country                           488
market_segment                      0
distribution_channel                0
is_repeated_guest                   0
previous_cancellations              0
previous_bookings_not_canceled      0
reserved_room_type                  0
assigned_room_type                  0
booking_changes                     0
deposit_type                        0
days_in_waiting_list                0
customer_type                       0
```

```
adr                             0
required_car_parking_spaces     0
total_of_special_requests       0
reservation_status              0
reservation_status_date         0
dtype: int64
```

```
# Replace missing values in a specific column with a chosen value
df['children'] = df['children'].fillna(1)
```

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

```
hotel                           0
is_canceled                     0
lead_time                       0
arrival_date_year               0
arrival_date_month              0
arrival_date_week_number        0
arrival_date_day_of_month       0
stays_in_weekend_nights         0
stays_in_week_nights            0
adults                          0
children                        0
babies                          0
meal                            0
country                       488
market_segment                  0
distribution_channel            0
is_repeated_guest               0
previous_cancellations          0
previous_bookings_not_canceled  0
reserved_room_type              0
assigned_room_type              0
booking_changes                 0
deposit_type                    0
days_in_waiting_list            0
customer_type                   0
adr                             0
required_car_parking_spaces     0
total_of_special_requests       0
reservation_status              0
reservation_status_date         0
dtype: int64
```

```
df.describe()
```

	is_canceled	lead_time	arrival_date_year	arrival_date_week_number	arrival_date_day_of_mo
count	119390.000000	119390.000000	119390.000000	119390.000000	119390.000
mean	0.370416	104.011416	2016.156554	27.165173	15.798
std	0.482918	106.863097	0.707476	13.605138	8.780
min	0.000000	0.000000	2015.000000	1.000000	1.000
25%	0.000000	18.000000	2016.000000	16.000000	8.000
50%	0.000000	69.000000	2016.000000	28.000000	16.000
75%	1.000000	160.000000	2017.000000	38.000000	23.000
max	1.000000	737.000000	2017.000000	53.000000	31.000

```
df = df[df['adr']<1000]
```

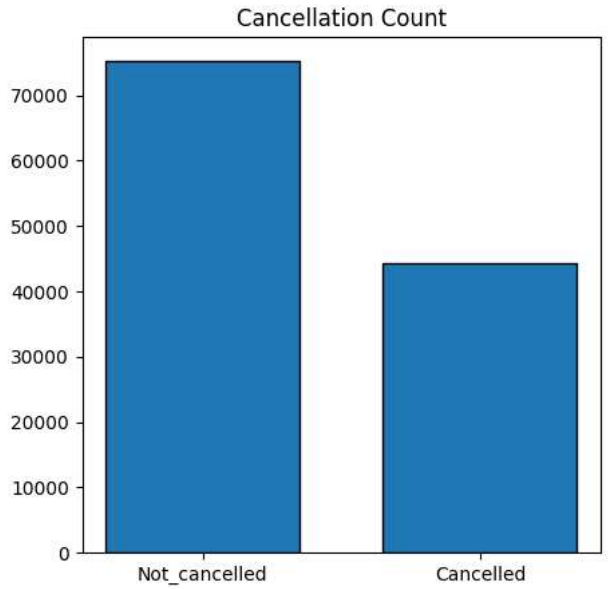
```
df.describe()
```

	is_canceled	lead_time	arrival_date_year	arrival_date_week_number	arrival_date_day_of_mc
count	119389.000000	119389.000000	119389.000000	119389.000000	119389.000
mean	0.370411	104.011994	2016.156555	27.165292	15.798
std	0.482917	106.863358	0.707479	13.605134	8.780
min	0.000000	0.000000	2015.000000	1.000000	1.000

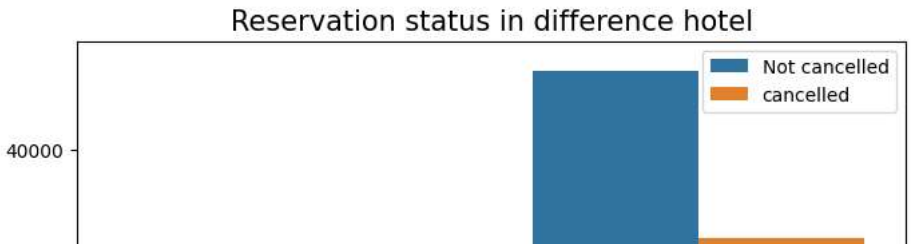
Data Analysis & Visualization

```
cancelled_perc = df['is_canceled'].value_counts(normalize = True)
print(cancelled_perc)


plt.figure(figsize= (5,5))
plt.title('Cancellation Count')
plt.bar(['Not_cancelled','Cancelled'], df['is_canceled'].value_counts(), edgecolor = 'k', width = 0.7)
```

```
0    0.629589
1    0.370411
Name: is_canceled, dtype: float64
<BarContainer object of 2 artists>
```

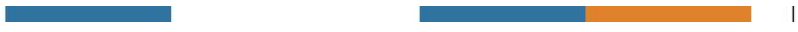



```
plt.figure(figsize= (8,6))
ax1= sns.countplot(x = 'hotel', hue = 'is_canceled', data= df )
legend_labels,_ = ax1. get_legend_handles_labels()
plt.title('Reservation status in difference hotel', size =  15)
plt.legend(['Not cancelled','cancelled'])

plt.show()
```




```
resort_hotel = df[df['hotel'] == 'Resort Hotel']
resort_hotel['is_canceled'].value_counts(normalize = True)
```

```
0    0.722366
1    0.277634
Name: is_canceled, dtype: float64
```



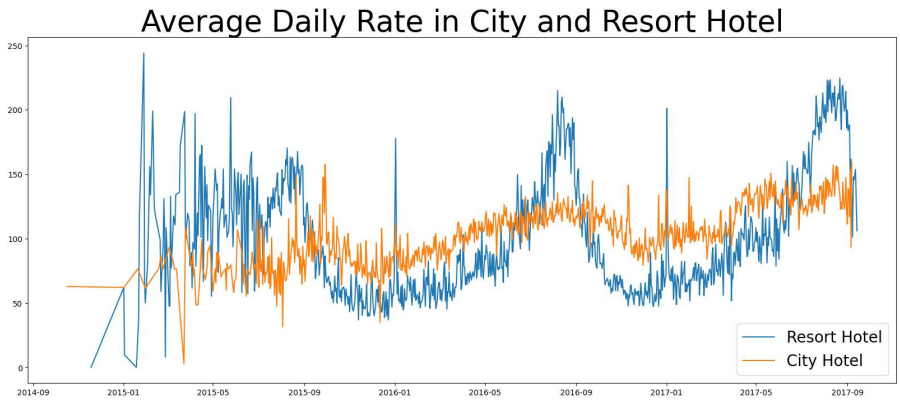
```
city_hotel = df[df['hotel'] == 'City Hotel']
city_hotel['is_canceled'].value_counts(normalize = True)
```

```
0    0.582738
1    0.417262
Name: is_canceled, dtype: float64
```

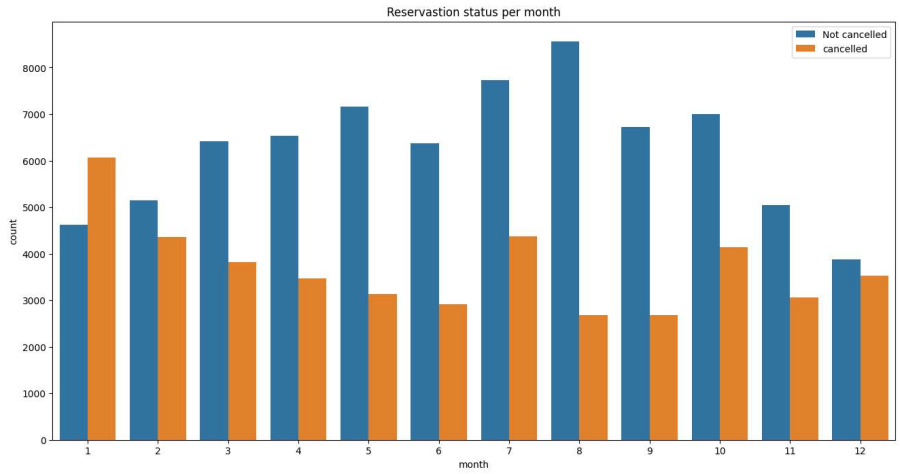
```
resort_hotel = resort_hotel.groupby('reservation_status_date')[['adr']].mean()
city_hotel = city_hotel.groupby('reservation_status_date')[['adr']].mean()
```

hotel

```
plt.figure(figsize = (20,8))
plt.title('Average Daily Rate in City and Resort Hotel', fontsize = 38)
plt.plot(resort_hotel.index, resort_hotel['adr'], label = 'Resort Hotel')
plt.plot(city_hotel.index, city_hotel['adr'], label = 'City Hotel')
plt.legend(fontsize = 20)
plt.show()
```

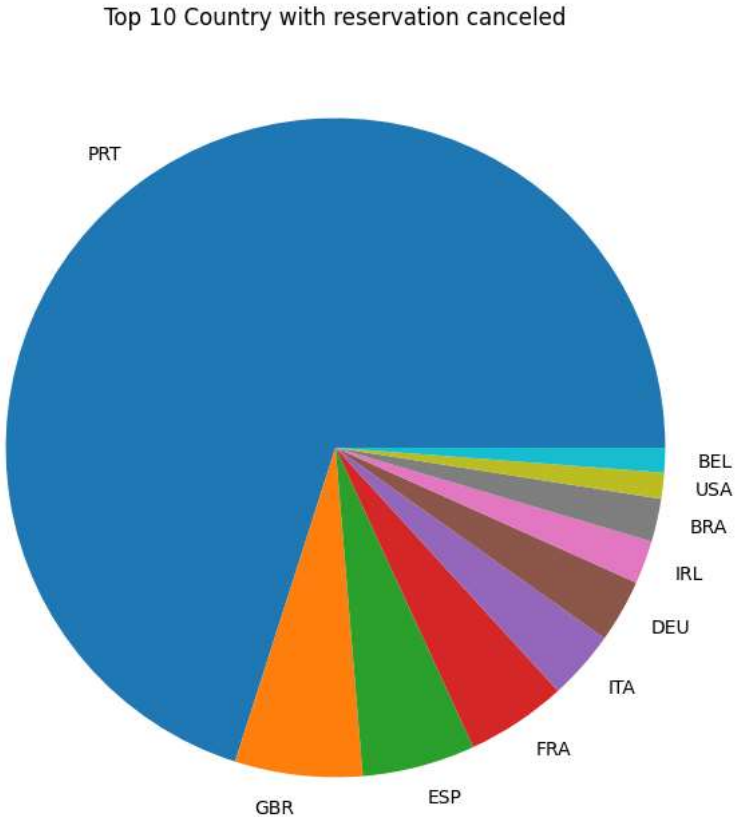



```
df['month'] = df['reservation_status_date'].dt.month

plt.figure(figsize = (16,8))
ax1 = sns.countplot(x = 'month', hue='is_canceled', data = df)
plt.legend(['Not cancelled','cancelled'])
plt.title('Reservastion status per month')
plt.show()
```




```
plt.figure(figsize = (15,8))
plt.title('ADR per month', fontsize= 30)
sns.barplot(x='month', y='adr', data=df[df['is_canceled'] == 1].groupby('month')[['adr']].sum().reset_index(), alpha=0.8)
plt.show()
```


```
cancelled_data = df[df['is_canceled'] == 1]
top_10_country = cancelled_data['country'].value_counts()[:10]
plt.figure(figsize = (8,8))
plt.title('Top 10 Country with reservation canceled' )
plt.pie(top_10_country, labels = top_10_country.index)
plt.show()
```




```
df['market_segment'].value_counts()
```

```
Online TA        56477
Offline TA/TO    24218
Groups           19811
Direct           12606
Corporate         5295
Complementary      743
Aviation           237
Undefined            2
Name: market_segment, dtype: int64
```

```
df['market_segment'].value_counts(normalize = True)
```

```
Online TA        0.473050
Offline TA/TO    0.202850
Groups           0.165937
Direct           0.105588
Corporate        0.044351
Complementary    0.006223
Aviation         0.001985
Undefined        0.000017
Name: market_segment, dtype: float64
```

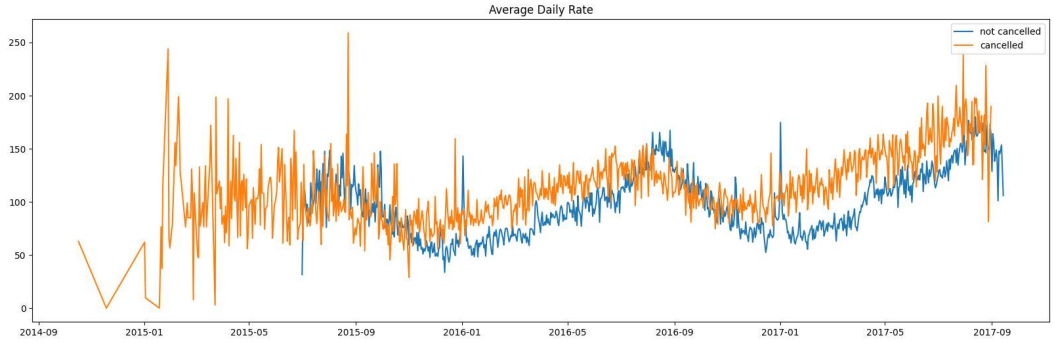
```
cancelled_data['market_segment'].value_counts(normalize = True)
```

```
Online TA        0.468964
Groups           0.273545
Offline TA/TO    0.187911
Direct           0.043733
Corporate        0.022432
Complementary    0.002193
Aviation         0.001176
Undefined        0.000045
Name: market_segment, dtype: float64
```

```
cancelled_df_adr = cancelled_data.groupby('reservation_status_date')[['adr']].mean()
cancelled_df_adr.reset_index(inplace=True)
cancelled_df_adr.sort_values('reservation_status_date', inplace=True)

not_cancelled_data=df[df['is_canceled'] == 0]
not_cancelled_df_adr = not_cancelled_data.groupby('reservation_status_date')[['adr']].mean()
not_cancelled_df_adr.reset_index(inplace=True)
not_cancelled_df_adr.sort_values('reservation_status_date', inplace=True)
```

```
plt.figure(figsize = (20,6))
plt.title('Average Daily Rate')
plt.plot(not_cancelled_df_adr['reservation_status_date'], not_cancelled_df_adr['adr'], label = 'not cancelled')
plt.plot(cancelled_df_adr['reservation_status_date'], cancelled_df_adr['adr'], label = 'cancelled')

plt.legend()
```

```
<matplotlib.legend.Legend at 0x7b4f48c7cf10>
```




```
cancelled_df_adr = cancelled_df_adr[(cancelled_df_adr['reservation_status_date']>'2016')&(cancelled_df_adr['reservation_status_date']<'2017-0
not_cancelled_df_adr = not_cancelled_df_adr[(not_cancelled_df_adr['reservation_status_date']>'2016')&(not_cancelled_df_adr['reservation_statu

plt.figure(figsize = (20,8))
plt.title('Average Daily Rate', fontsize = 20)
plt.plot(not_cancelled_df_adr['reservation_status_date'], not_cancelled_df_adr['adr'], label = 'not cancelled')
plt.plot(cancelled_df_adr['reservation_status_date'], cancelled_df_adr['adr'], label ='cancelled')
plt.legend(fontsize=20)
```

```
<matplotlib.legend.Legend at 0x7b4f4894e9b0>
```