Московский государственный технический университет им. Н.Э. Баумана
Кафедра «Системы обработки информации и управления»

Лабораторная работа №1
по дисциплине
«Методы машинного обучения»
на тему
«Разведочный анализ данных. Исследование и
визуализация данных»

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```
[9]: import numpy as np
     import pandas as pd
     import seaborn as sns
     import matplotlib.pyplot as plt

     #                      Jupyter,
     %matplotlib inline

     #                  ,
     sns.set(style="ticks")
```

```
[21]: #
      data = pd.read_csv('Downloads/hotel_bookings.csv', sep=",")
```

```
[22]: #         5
      data.head()
```

```
[22]:          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

```
2                          0                          0        Check-Out
3                          0                          0        Check-Out
4                          0                          1        Check-Out

  reservation_status_date
0              2015-07-01
1              2015-07-01
2              2015-07-02
3              2015-07-02
4              2015-07-03

[5 rows x 32 columns]
```

[23]:
```python
#                  (                  ), 112      8
data.shape
```

[23]: (119390, 32)

[24]:
```python
total_qnt = data.shape[0]
print('                {}'.format(total_qnt))
```

```
                119390
```

[25]:
```python
#
data.columns
```

[25]:
```
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')
```

[26]:
```python
#
data.dtypes
```

[26]:
```
hotel                           object
is_canceled                      int64
lead_time                        int64
arrival_date_year                int64
arrival_date_month              object
arrival_date_week_number         int64
arrival_date_day_of_month        int64
stays_in_weekend_nights          int64
```

```
stays_in_week_nights                   int64
adults                                 int64
children                             float64
babies                                 int64
meal                                  object
country                               object
market_segment                        object
distribution_channel                  object
is_repeated_guest                      int64
previous_cancellations                 int64
previous_bookings_not_canceled         int64
reserved_room_type                    object
assigned_room_type                    object
booking_changes                        int64
deposit_type                          object
agent                                float64
company                              float64
days_in_waiting_list                   int64
customer_type                         object
adr                                  float64
required_car_parking_spaces            int64
total_of_special_requests              int64
reservation_status                    object
reservation_status_date               object
dtype: object
```

[27]:
```python
#
for i in data.columns:
    null_qnt = data[data[i].isnull()].shape[0]
    print('{} - {}'.format(i, null_qnt))
```

```
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
```

[28]:
```python
#                  ()
data.describe()
```

[28]:

	is_canceled	lead_time	arrival_date_year
count	119390.000000	119390.000000	119390.000000
mean	0.370416	104.011416	2016.156554
std	0.482918	106.863097	0.707476
min	0.000000	0.000000	2015.000000
25%	0.000000	18.000000	2016.000000
50%	0.000000	69.000000	2016.000000
75%	1.000000	160.000000	2017.000000
max	1.000000	737.000000	2017.000000

	arrival_date_week_number	arrival_date_day_of_month
count	119390.000000	119390.000000
mean	27.165173	15.798241
std	13.605138	8.780829
min	1.000000	1.000000
25%	16.000000	8.000000
50%	28.000000	16.000000
75%	38.000000	23.000000
max	53.000000	31.000000

	stays_in_weekend_nights	stays_in_week_nights	adults
count	119390.000000	119390.000000	119390.000000
mean	0.927599	2.500302	1.856403
std	0.998613	1.908286	0.579261
min	0.000000	0.000000	0.000000
25%	0.000000	1.000000	2.000000
50%	1.000000	2.000000	2.000000
75%	2.000000	3.000000	2.000000
max	19.000000	50.000000	55.000000

	children	babies	is_repeated_guest
count	119386.000000	119390.000000	119390.000000

```
mean       0.103890          0.007949           0.031912
std        0.398561          0.097436           0.175767
min        0.000000          0.000000           0.000000
25%        0.000000          0.000000           0.000000
50%        0.000000          0.000000           0.000000
75%        0.000000          0.000000           0.000000
max       10.000000         10.000000           1.000000

       previous_cancellations  previous_bookings_not_canceled  \
count           119390.000000                   119390.000000
mean                 0.087118                        0.137097
std                  0.844336                        1.497437
min                  0.000000                        0.000000
25%                  0.000000                        0.000000
50%                  0.000000                        0.000000
75%                  0.000000                        0.000000
max                 26.000000                       72.000000

       booking_changes          agent       company  days_in_waiting_list  \
count    119390.000000  103050.000000   6797.000000         119390.000000
mean          0.221124      86.693382    189.266735              2.321149
std           0.652306     110.774548    131.655015             17.594721
min           0.000000       1.000000      6.000000              0.000000
25%           0.000000       9.000000     62.000000              0.000000
50%           0.000000      14.000000    179.000000              0.000000
75%           0.000000     229.000000    270.000000              0.000000
max          21.000000     535.000000    543.000000            391.000000

                 adr  required_car_parking_spaces  total_of_special_requests
count  119390.000000                119390.000000              119390.000000
mean      101.831122                     0.062518                   0.571363
std        50.535790                     0.245291                   0.792798
min        -6.380000                     0.000000                   0.000000
25%        69.290000                     0.000000                   0.000000
50%        94.575000                     0.000000                   0.000000
75%       126.000000                     0.000000                   1.000000
max      5400.000000                     8.000000                   5.000000
```

[29]:
```
#
data["hotel"].unique()
```

[29]: array(['Resort Hotel', 'City Hotel'], dtype=object)

[39]:
```
#
fig, ax = plt.subplots(figsize=(10,10))
sns.scatterplot(ax=ax, x='hotel', y='adults', data=data)
```

[39]: <matplotlib.axes._subplots.AxesSubplot at 0x10a890908>
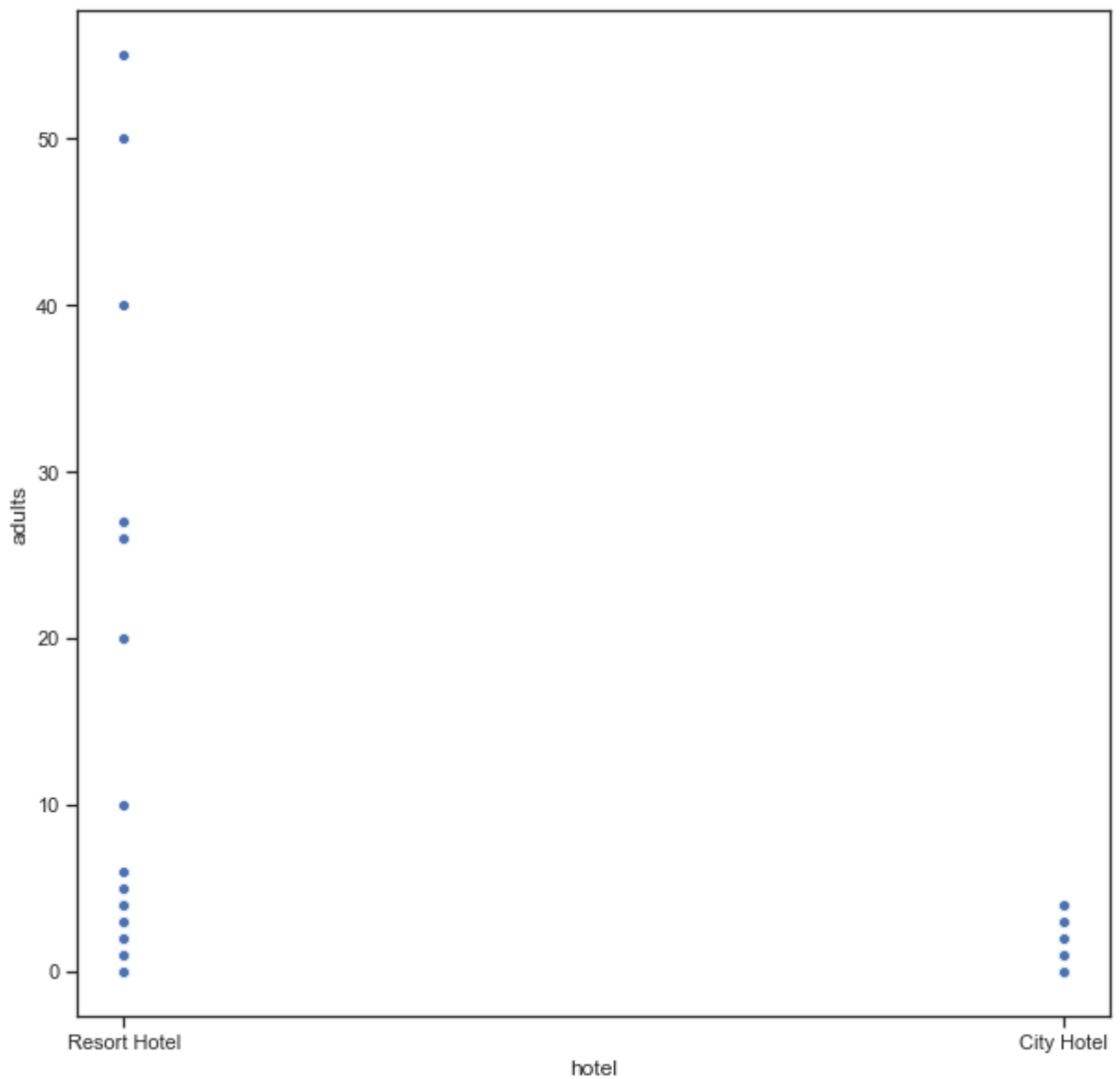
```
[41]: #                                          (              -                    )
      fig, ax = plt.subplots(figsize=(10,10))
      sns.scatterplot(ax=ax, x='hotel', y='adults', data=data,␣
       ↪hue='stays_in_week_nights')
```

[41]: <matplotlib.axes._subplots.AxesSubplot at 0x1290eba58>
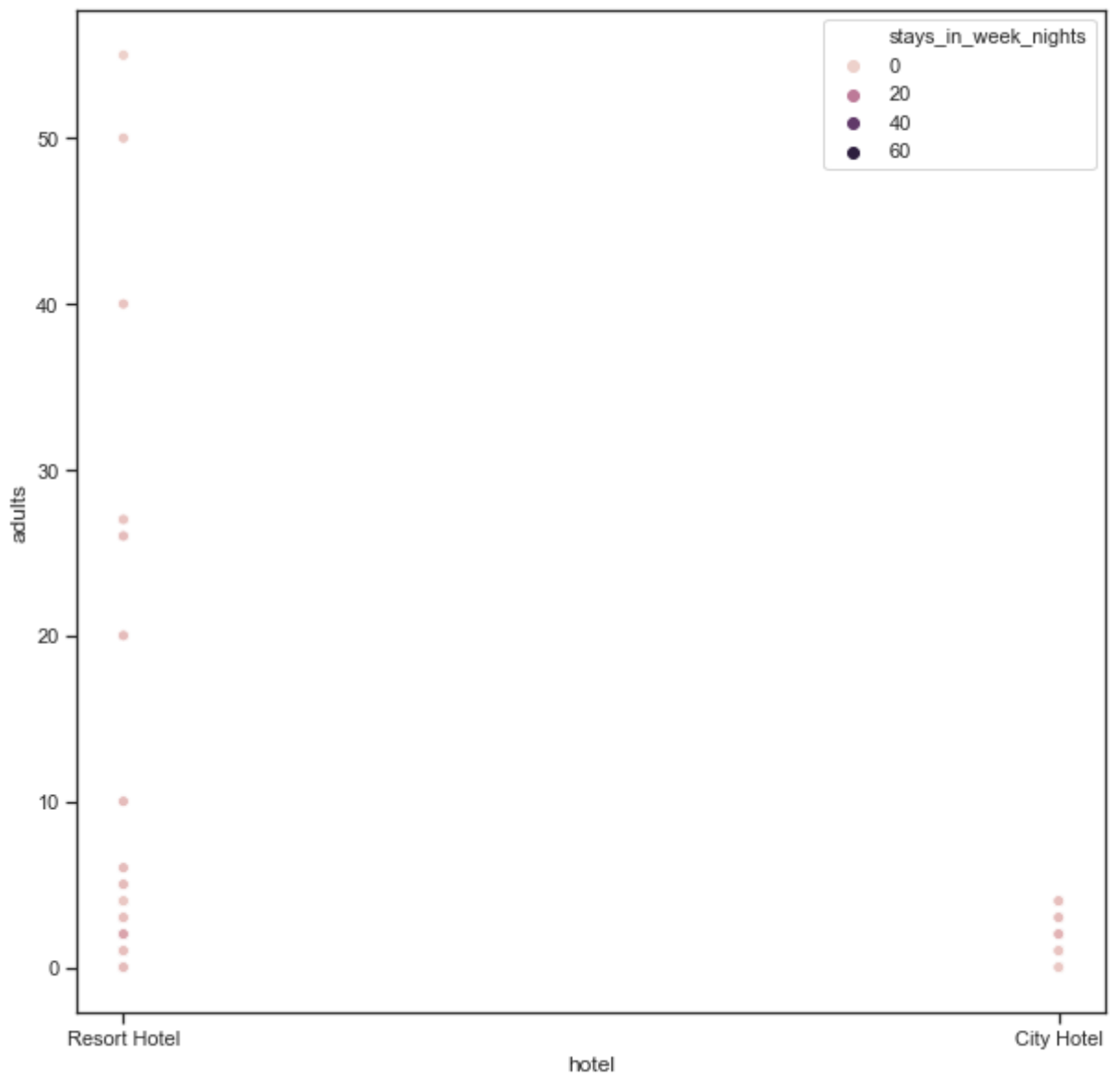
```
[48]:   #
        fig, ax = plt.subplots(figsize=(30,10))
        sns.distplot(data['stays_in_week_nights'])
```

[48]: <matplotlib.axes._subplots.AxesSubplot at 0x1278d9710>
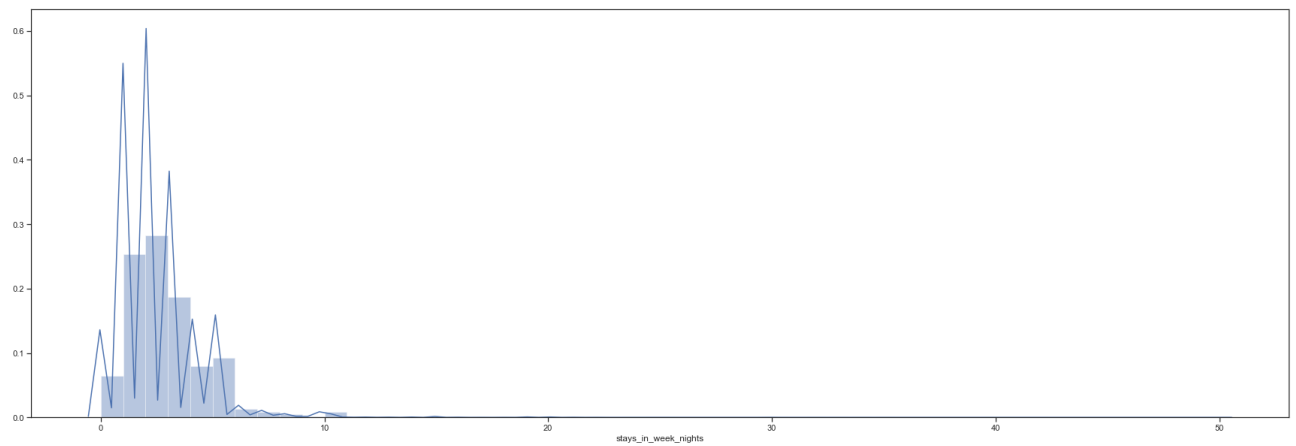
```
[54]: #
      sns.jointplot(x='stays_in_week_nights', y='adults', data=data)
```

```
[54]: <seaborn.axisgrid.JointGrid at 0x1301f7a90>
```
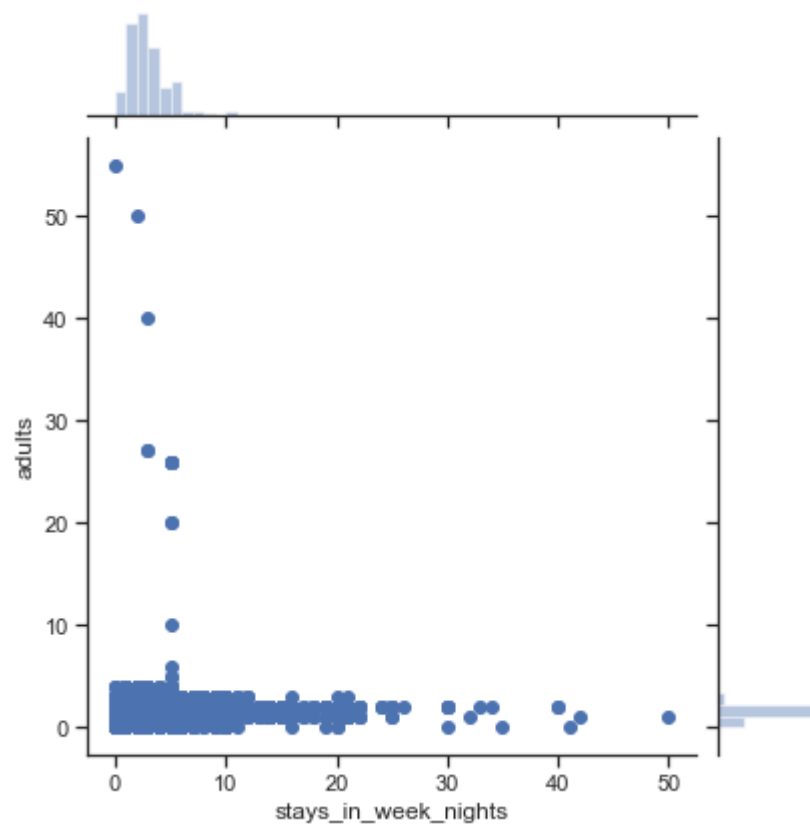


```
[55]: #
      sns.jointplot(x='stays_in_week_nights', y='adults', data=data, kind="hex")
```

```
[55]: <seaborn.axisgrid.JointGrid at 0x127d90668>
```
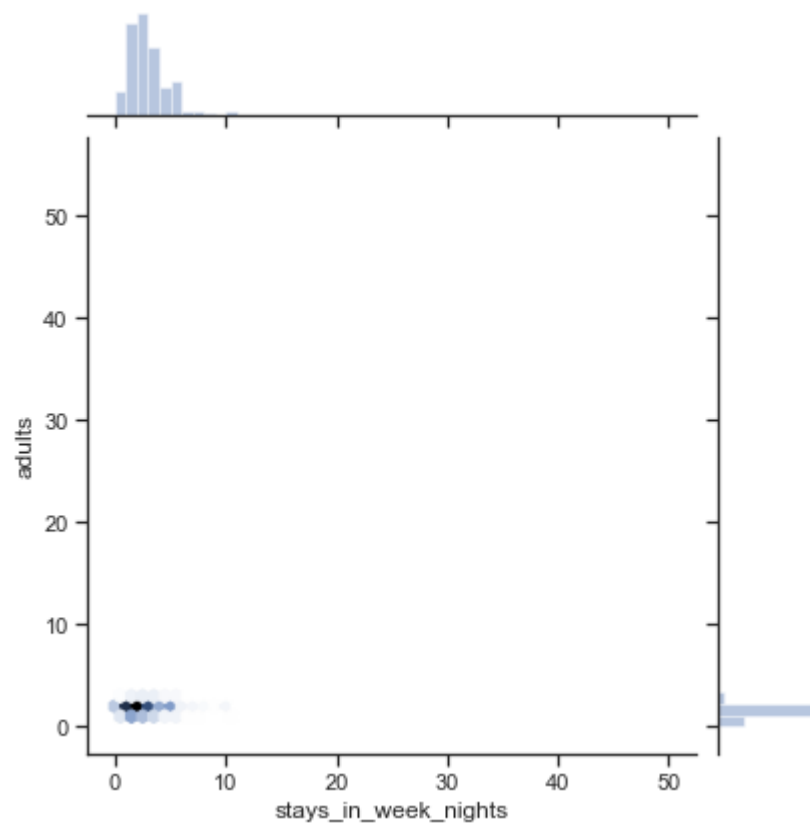
```
[60]: #
      sns.jointplot(x='stays_in_week_nights', y='adults', data=data, kind="kde",␣
       ↪height = 10, ratio = 10)
```

[60]: <seaborn.axisgrid.JointGrid at 0x133e79e10>
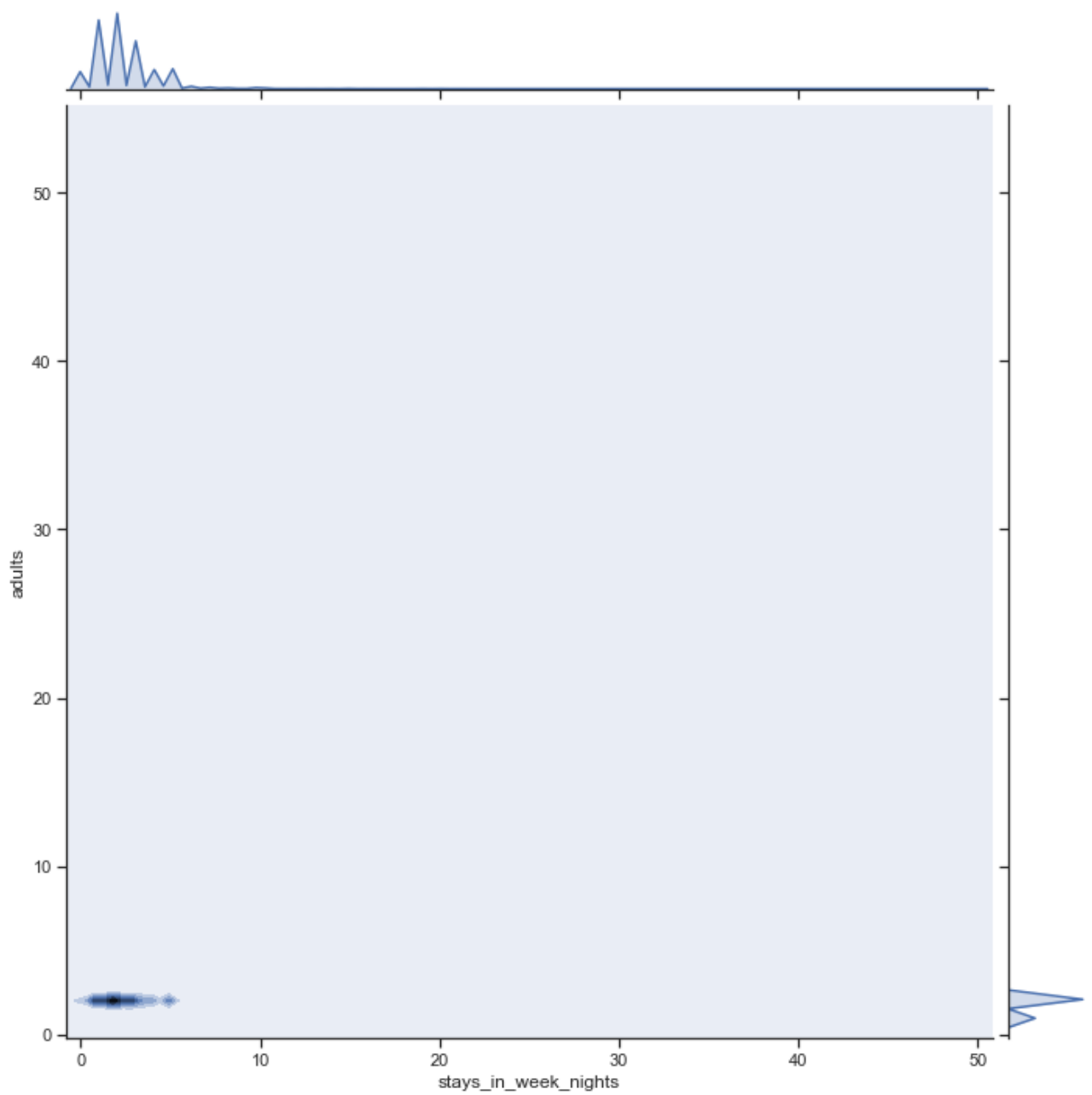
```
[63]:  #   ,                                          ,             )
       sns.pairplot(data)
```

```
[63]: <seaborn.axisgrid.PairGrid at 0x1a3174a58>
```
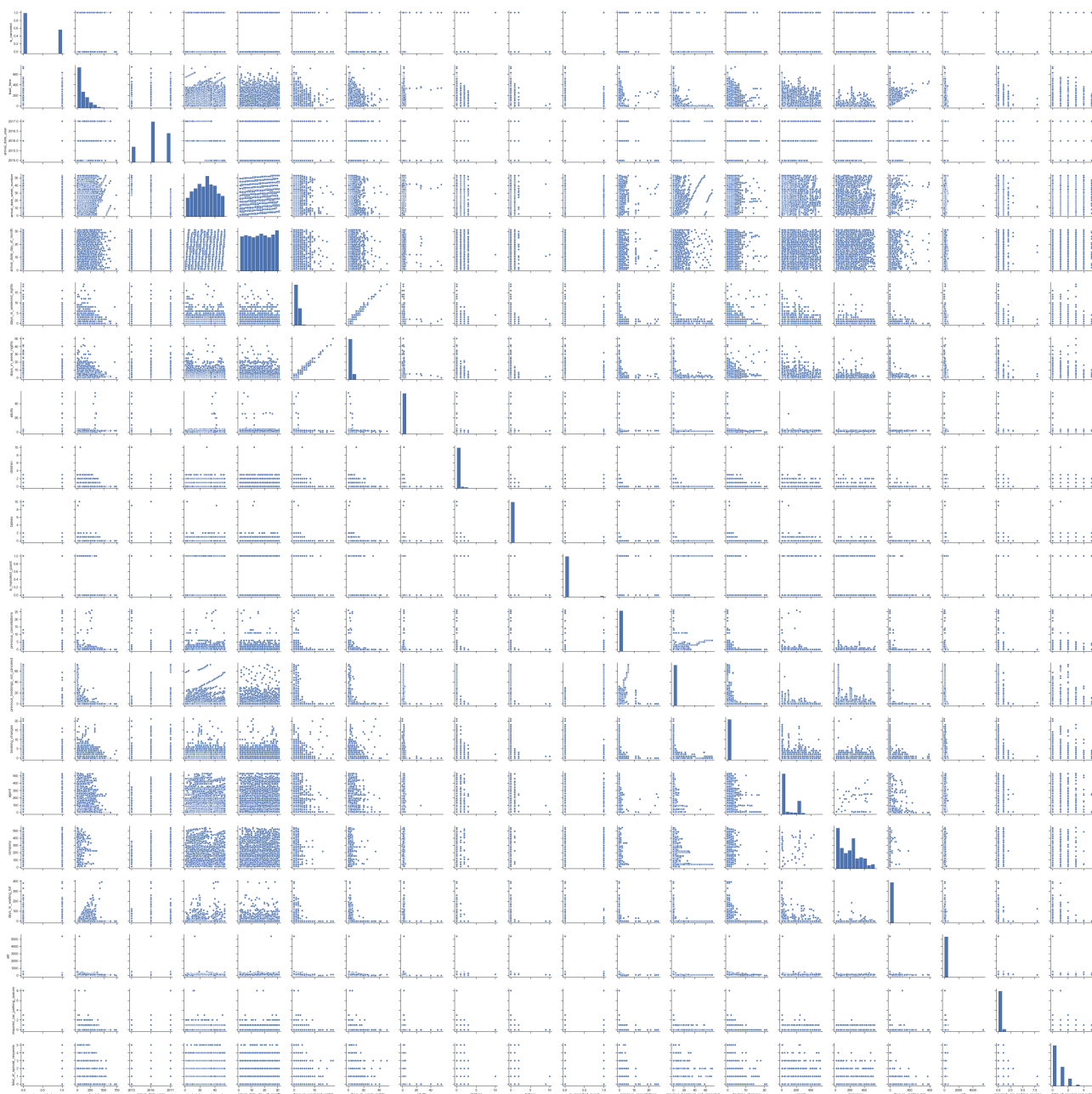
```
[66]:  #
       sns.boxplot(x=data['stays_in_week_nights'])
```

[66]: <matplotlib.axes._subplots.AxesSubplot at 0x1e2d6f438>
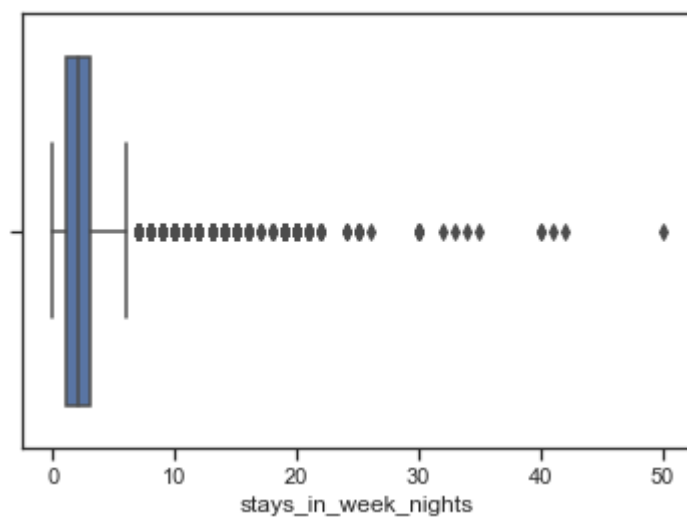
```
[67]:  #
       sns.boxplot(y=data['stays_in_week_nights'])
```

```
[67]:  <matplotlib.axes._subplots.AxesSubplot at 0x1e2e01940>
```
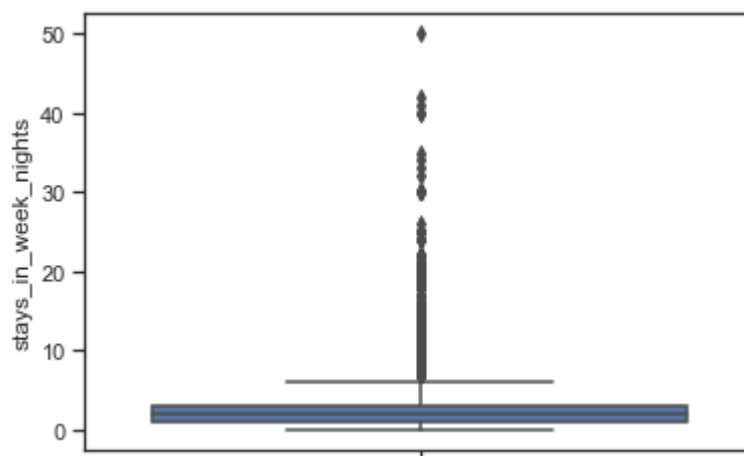


```
[70]:  #
       sns.violinplot(x=data['stays_in_week_nights'])
```

```
[70]:  <matplotlib.axes._subplots.AxesSubplot at 0x1dd34d5c0>
```
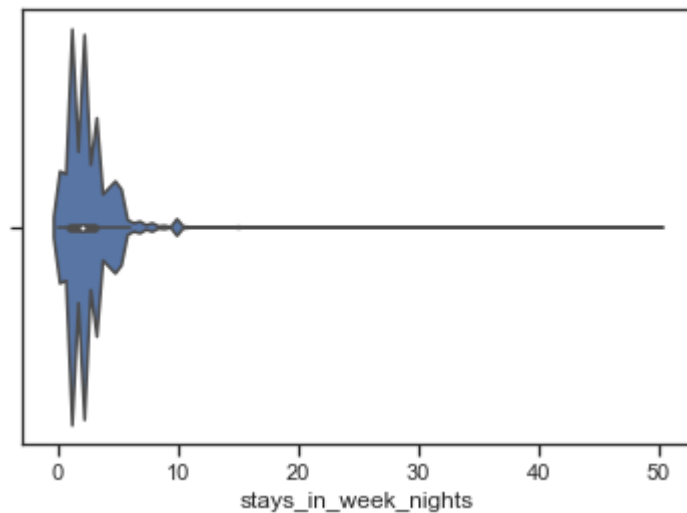
```
[71]: #                          (                              )
      data.corr()

[71]:                                 is_canceled  lead_time  arrival_date_year  \
      is_canceled                        1.000000   0.293123           0.016660
      lead_time                          0.293123   1.000000           0.040142
      arrival_date_year                  0.016660   0.040142           1.000000
      arrival_date_week_number           0.008148   0.126871          -0.540561
      arrival_date_day_of_month         -0.006130   0.002268          -0.000221
      stays_in_weekend_nights           -0.001791   0.085671           0.021497
      stays_in_week_nights               0.024765   0.165799           0.030883
      adults                             0.060017   0.119519           0.029635
      children                           0.005048  -0.037622           0.054624
      babies                            -0.032491  -0.020915          -0.013192
      is_repeated_guest                 -0.084793  -0.124410           0.010341
      previous_cancellations             0.110133   0.086042          -0.119822
      previous_bookings_not_canceled    -0.057358  -0.073548           0.029218
      booking_changes                   -0.144381   0.000149           0.030872
      agent                             -0.083114  -0.069741           0.063457
      company                           -0.020642   0.151464           0.259095
      days_in_waiting_list               0.054186   0.170084          -0.056497
      adr                                0.047557  -0.063077           0.197580
      required_car_parking_spaces       -0.195498  -0.116451          -0.013684
      total_of_special_requests         -0.234658  -0.095712           0.108531

                                      arrival_date_week_number  \
      is_canceled                                     0.008148
      lead_time                                       0.126871
      arrival_date_year                              -0.540561
      arrival_date_week_number                        1.000000
      arrival_date_day_of_month                       0.066809
      stays_in_weekend_nights                         0.018208
      stays_in_week_nights                            0.015558
      adults                                          0.025909
```

```
children                         0.005518
babies                           0.010395
is_repeated_guest               -0.030131
previous_cancellations           0.035501
previous_bookings_not_canceled  -0.020904
booking_changes                  0.005508
agent                           -0.031201
company                         -0.076760
days_in_waiting_list             0.022933
adr                              0.075791
required_car_parking_spaces      0.001920
total_of_special_requests        0.026149

                                arrival_date_day_of_month  \
is_canceled                                     -0.006130
lead_time                                        0.002268
arrival_date_year                               -0.000221
arrival_date_week_number                         0.066809
arrival_date_day_of_month                        1.000000
stays_in_weekend_nights                         -0.016354
stays_in_week_nights                            -0.028174
adults                                          -0.001566
children                                         0.014544
babies                                          -0.000230
is_repeated_guest                               -0.006145
previous_cancellations                          -0.027011
previous_bookings_not_canceled                  -0.000300
booking_changes                                  0.010613
agent                                            0.001487
company                                          0.044858
days_in_waiting_list                             0.022728
adr                                              0.030245
required_car_parking_spaces                      0.008683
total_of_special_requests                        0.003062

                                stays_in_weekend_nights  ␣
 ↪stays_in_week_nights  \
is_canceled                                    -0.001791                 0.024765
lead_time                                       0.085671                 0.165799
arrival_date_year                               0.021497                 0.030883
arrival_date_week_number                        0.018208                 0.015558
arrival_date_day_of_month                      -0.016354                -0.028174
stays_in_weekend_nights                         1.000000                 0.498969
stays_in_week_nights                            0.498969                 1.000000
adults                                          0.091871                 0.092976
children                                        0.045793                 0.044203
babies                                          0.018483                 0.020191
is_repeated_guest                              -0.087239                -0.097245
previous_cancellations                         -0.012775                -0.013992
```

```
previous_bookings_not_canceled                  -0.042715            -0.048743
booking_changes                                  0.063281             0.096209
agent                                            0.140739             0.182382
company                                          0.066749             0.182211
days_in_waiting_list                            -0.054151            -0.002020
adr                                              0.049342             0.065237
required_car_parking_spaces                     -0.018554            -0.024859
total_of_special_requests                        0.072671             0.068192


                                adults   children    babies  \
is_canceled                    0.060017   0.005048 -0.032491
lead_time                      0.119519  -0.037622 -0.020915
arrival_date_year              0.029635   0.054624 -0.013192
arrival_date_week_number       0.025909   0.005518  0.010395
arrival_date_day_of_month     -0.001566   0.014544 -0.000230
stays_in_weekend_nights        0.091871   0.045793  0.018483
stays_in_week_nights           0.092976   0.044203  0.020191
adults                         1.000000   0.030447  0.018146
children                       0.030447   1.000000  0.024030
babies                         0.018146   0.024030  1.000000
is_repeated_guest             -0.146426  -0.032859 -0.008943
previous_cancellations        -0.006738  -0.024730 -0.007501
previous_bookings_not_canceled -0.107983 -0.021072 -0.006550
booking_changes               -0.051673   0.048949  0.083440
agent                         -0.035594   0.041066  0.036184
company                        0.207793   0.030931  0.019206
days_in_waiting_list          -0.008283  -0.033273 -0.010621
adr                            0.230641   0.324854  0.029186
required_car_parking_spaces    0.014785   0.056253  0.037383
total_of_special_requests      0.122884   0.081745  0.097889


                                is_repeated_guest  previous_cancellations  \
is_canceled                             -0.084793                0.110133
lead_time                               -0.124410                0.086042
arrival_date_year                        0.010341               -0.119822
arrival_date_week_number                -0.030131                0.035501
arrival_date_day_of_month               -0.006145               -0.027011
stays_in_weekend_nights                 -0.087239               -0.012775
stays_in_week_nights                    -0.097245               -0.013992
adults                                  -0.146426               -0.006738
children                                -0.032859               -0.024730
babies                                  -0.008943               -0.007501
is_repeated_guest                        1.000000                0.082293
previous_cancellations                   0.082293                1.000000
previous_bookings_not_canceled           0.418056                0.152728
booking_changes                          0.012092               -0.026993
agent                                    0.031527               -0.012488
company                                 -0.244586               -0.184574
days_in_waiting_list                    -0.022235                0.005929
adr                                     -0.134314               -0.065646
```

```
required_car_parking_spaces                 0.077090             -0.018492
total_of_special_requests                   0.013050             -0.048384

                                previous_bookings_not_canceled  \
is_canceled                                          -0.057358
lead_time                                            -0.073548
arrival_date_year                                     0.029218
arrival_date_week_number                             -0.020904
arrival_date_day_of_month                            -0.000300
stays_in_weekend_nights                              -0.042715
stays_in_week_nights                                 -0.048743
adults                                               -0.107983
children                                             -0.021072
babies                                               -0.006550
is_repeated_guest                                     0.418056
previous_cancellations                                0.152728
previous_bookings_not_canceled                        1.000000
booking_changes                                       0.011608
agent                                                 0.023252
company                                              -0.208557
days_in_waiting_list                                 -0.009397
adr                                                  -0.072144
required_car_parking_spaces                           0.047653
total_of_special_requests                             0.037824

                                booking_changes     agent   company  \
is_canceled                           -0.144381 -0.083114 -0.020642
lead_time                              0.000149 -0.069741  0.151464
arrival_date_year                      0.030872  0.063457  0.259095
arrival_date_week_number               0.005508 -0.031201 -0.076760
arrival_date_day_of_month              0.010613  0.001487  0.044858
stays_in_weekend_nights                0.063281  0.140739  0.066749
stays_in_week_nights                   0.096209  0.182382  0.182211
adults                                -0.051673 -0.035594  0.207793
children                               0.048949  0.041066  0.030931
babies                                 0.083440  0.036184  0.019206
is_repeated_guest                      0.012092  0.031527 -0.244586
previous_cancellations                -0.026993 -0.012488 -0.184574
previous_bookings_not_canceled         0.011608  0.023252 -0.208557
booking_changes                        1.000000  0.067010  0.122098
agent                                  0.067010  1.000000  0.350746
company                                0.122098  0.350746  1.000000
days_in_waiting_list                  -0.011634 -0.055151  0.000411
adr                                    0.019618 -0.024695  0.086376
required_car_parking_spaces            0.065620  0.177353 -0.012916
total_of_special_requests              0.052833  0.034162 -0.098558

                                days_in_waiting_list       adr  \
is_canceled                                 0.054186  0.047557
lead_time                                   0.170084 -0.063077
```

	days_in_waiting_list	adr
arrival_date_year	-0.056497	0.197580
arrival_date_week_number	0.022933	0.075791
arrival_date_day_of_month	0.022728	0.030245
stays_in_weekend_nights	-0.054151	0.049342
stays_in_week_nights	-0.002020	0.065237
adults	-0.008283	0.230641
children	-0.033273	0.324854
babies	-0.010621	0.029186
is_repeated_guest	-0.022235	-0.134314
previous_cancellations	0.005929	-0.065646
previous_bookings_not_canceled	-0.009397	-0.072144
booking_changes	-0.011634	0.019618
agent	-0.055151	-0.024695
company	0.000411	0.086376
days_in_waiting_list	1.000000	-0.040756
adr	-0.040756	1.000000
required_car_parking_spaces	-0.030600	0.056628
total_of_special_requests	-0.082730	0.172185

	required_car_parking_spaces \
is_canceled	-0.195498
lead_time	-0.116451
arrival_date_year	-0.013684
arrival_date_week_number	0.001920
arrival_date_day_of_month	0.008683
stays_in_weekend_nights	-0.018554
stays_in_week_nights	-0.024859
adults	0.014785
children	0.056253
babies	0.037383
is_repeated_guest	0.077090
previous_cancellations	-0.018492
previous_bookings_not_canceled	0.047653
booking_changes	0.065620
agent	0.177353
company	-0.012916
days_in_waiting_list	-0.030600
adr	0.056628
required_car_parking_spaces	1.000000
total_of_special_requests	0.082626

	total_of_special_requests
is_canceled	-0.234658
lead_time	-0.095712
arrival_date_year	0.108531
arrival_date_week_number	0.026149
arrival_date_day_of_month	0.003062
stays_in_weekend_nights	0.072671
stays_in_week_nights	0.068192
adults	0.122884

```
children                         0.081745
babies                           0.097889
is_repeated_guest                0.013050
previous_cancellations          -0.048384
previous_bookings_not_canceled   0.037824
booking_changes                  0.052833
agent                            0.034162
company                         -0.098558
days_in_waiting_list            -0.082730
adr                              0.172185
required_car_parking_spaces      0.082626
total_of_special_requests        1.000000
```

```
[72]: #                    (          )
      data.corr(method='pearson')
```

```
[72]:                                 is_canceled  lead_time  arrival_date_year  \
      is_canceled                        1.000000   0.293123           0.016660
      lead_time                          0.293123   1.000000           0.040142
      arrival_date_year                  0.016660   0.040142           1.000000
      arrival_date_week_number           0.008148   0.126871          -0.540561
      arrival_date_day_of_month         -0.006130   0.002268          -0.000221
      stays_in_weekend_nights           -0.001791   0.085671           0.021497
      stays_in_week_nights               0.024765   0.165799           0.030883
      adults                             0.060017   0.119519           0.029635
      children                           0.005048  -0.037622           0.054624
      babies                            -0.032491  -0.020915          -0.013192
      is_repeated_guest                 -0.084793  -0.124410           0.010341
      previous_cancellations             0.110133   0.086042          -0.119822
      previous_bookings_not_canceled    -0.057358  -0.073548           0.029218
      booking_changes                   -0.144381   0.000149           0.030872
      agent                             -0.083114  -0.069741           0.063457
      company                           -0.020642   0.151464           0.259095
      days_in_waiting_list               0.054186   0.170084          -0.056497
      adr                                0.047557  -0.063077           0.197580
      required_car_parking_spaces       -0.195498  -0.116451          -0.013684
      total_of_special_requests         -0.234658  -0.095712           0.108531

                                      arrival_date_week_number  \
      is_canceled                                     0.008148
      lead_time                                       0.126871
      arrival_date_year                              -0.540561
      arrival_date_week_number                        1.000000
      arrival_date_day_of_month                       0.066809
      stays_in_weekend_nights                         0.018208
      stays_in_week_nights                            0.015558
      adults                                          0.025909
      children                                        0.005518
      babies                                          0.010395
      is_repeated_guest                              -0.030131
```

```
previous_cancellations                          0.035501
previous_bookings_not_canceled                 -0.020904
booking_changes                                 0.005508
agent                                          -0.031201
company                                        -0.076760
days_in_waiting_list                            0.022933
adr                                             0.075791
required_car_parking_spaces                     0.001920
total_of_special_requests                       0.026149

                                arrival_date_day_of_month  \
is_canceled                                      -0.006130
lead_time                                         0.002268
arrival_date_year                                -0.000221
arrival_date_week_number                          0.066809
arrival_date_day_of_month                         1.000000
stays_in_weekend_nights                          -0.016354
stays_in_week_nights                             -0.028174
adults                                           -0.001566
children                                          0.014544
babies                                           -0.000230
is_repeated_guest                                -0.006145
previous_cancellations                           -0.027011
previous_bookings_not_canceled                   -0.000300
booking_changes                                   0.010613
agent                                             0.001487
company                                           0.044858
days_in_waiting_list                              0.022728
adr                                               0.030245
required_car_parking_spaces                       0.008683
total_of_special_requests                         0.003062

                                stays_in_weekend_nights  ␣
→stays_in_week_nights  \
is_canceled                                      -0.001791                 0.024765
lead_time                                         0.085671                 0.165799
arrival_date_year                                 0.021497                 0.030883
arrival_date_week_number                          0.018208                 0.015558
arrival_date_day_of_month                        -0.016354                -0.028174
stays_in_weekend_nights                           1.000000                 0.498969
stays_in_week_nights                              0.498969                 1.000000
adults                                            0.091871                 0.092976
children                                          0.045793                 0.044203
babies                                            0.018483                 0.020191
is_repeated_guest                                -0.087239                -0.097245
previous_cancellations                           -0.012775                -0.013992
previous_bookings_not_canceled                   -0.042715                -0.048743
booking_changes                                   0.063281                 0.096209
agent                                             0.140739                 0.182382
```

company	0.066749	0.182211
days_in_waiting_list	-0.054151	-0.002020
adr	0.049342	0.065237
required_car_parking_spaces	-0.018554	-0.024859
total_of_special_requests	0.072671	0.068192

	adults	children	babies
is_canceled	0.060017	0.005048	-0.032491
lead_time	0.119519	-0.037622	-0.020915
arrival_date_year	0.029635	0.054624	-0.013192
arrival_date_week_number	0.025909	0.005518	0.010395
arrival_date_day_of_month	-0.001566	0.014544	-0.000230
stays_in_weekend_nights	0.091871	0.045793	0.018483
stays_in_week_nights	0.092976	0.044203	0.020191
adults	1.000000	0.030447	0.018146
children	0.030447	1.000000	0.024030
babies	0.018146	0.024030	1.000000
is_repeated_guest	-0.146426	-0.032859	-0.008943
previous_cancellations	-0.006738	-0.024730	-0.007501
previous_bookings_not_canceled	-0.107983	-0.021072	-0.006550
booking_changes	-0.051673	0.048949	0.083440
agent	-0.035594	0.041066	0.036184
company	0.207793	0.030931	0.019206
days_in_waiting_list	-0.008283	-0.033273	-0.010621
adr	0.230641	0.324854	0.029186
required_car_parking_spaces	0.014785	0.056253	0.037383
total_of_special_requests	0.122884	0.081745	0.097889

	is_repeated_guest	previous_cancellations
is_canceled	-0.084793	0.110133
lead_time	-0.124410	0.086042
arrival_date_year	0.010341	-0.119822
arrival_date_week_number	-0.030131	0.035501
arrival_date_day_of_month	-0.006145	-0.027011
stays_in_weekend_nights	-0.087239	-0.012775
stays_in_week_nights	-0.097245	-0.013992
adults	-0.146426	-0.006738
children	-0.032859	-0.024730
babies	-0.008943	-0.007501
is_repeated_guest	1.000000	0.082293
previous_cancellations	0.082293	1.000000
previous_bookings_not_canceled	0.418056	0.152728
booking_changes	0.012092	-0.026993
agent	0.031527	-0.012488
company	-0.244586	-0.184574
days_in_waiting_list	-0.022235	0.005929
adr	-0.134314	-0.065646
required_car_parking_spaces	0.077090	-0.018492
total_of_special_requests	0.013050	-0.048384

	previous_bookings_not_canceled \
is_canceled	-0.057358
lead_time	-0.073548
arrival_date_year	0.029218
arrival_date_week_number	-0.020904
arrival_date_day_of_month	-0.000300
stays_in_weekend_nights	-0.042715
stays_in_week_nights	-0.048743
adults	-0.107983
children	-0.021072
babies	-0.006550
is_repeated_guest	0.418056
previous_cancellations	0.152728
previous_bookings_not_canceled	1.000000
booking_changes	0.011608
agent	0.023252
company	-0.208557
days_in_waiting_list	-0.009397
adr	-0.072144
required_car_parking_spaces	0.047653
total_of_special_requests	0.037824

	booking_changes	agent	company \
is_canceled	-0.144381	-0.083114	-0.020642
lead_time	0.000149	-0.069741	0.151464
arrival_date_year	0.030872	0.063457	0.259095
arrival_date_week_number	0.005508	-0.031201	-0.076760
arrival_date_day_of_month	0.010613	0.001487	0.044858
stays_in_weekend_nights	0.063281	0.140739	0.066749
stays_in_week_nights	0.096209	0.182382	0.182211
adults	-0.051673	-0.035594	0.207793
children	0.048949	0.041066	0.030931
babies	0.083440	0.036184	0.019206
is_repeated_guest	0.012092	0.031527	-0.244586
previous_cancellations	-0.026993	-0.012488	-0.184574
previous_bookings_not_canceled	0.011608	0.023252	-0.208557
booking_changes	1.000000	0.067010	0.122098
agent	0.067010	1.000000	0.350746
company	0.122098	0.350746	1.000000
days_in_waiting_list	-0.011634	-0.055151	0.000411
adr	0.019618	-0.024695	0.086376
required_car_parking_spaces	0.065620	0.177353	-0.012916
total_of_special_requests	0.052833	0.034162	-0.098558

	days_in_waiting_list	adr \
is_canceled	0.054186	0.047557
lead_time	0.170084	-0.063077
arrival_date_year	-0.056497	0.197580
arrival_date_week_number	0.022933	0.075791
arrival_date_day_of_month	0.022728	0.030245

	days_in_waiting_list	adr
stays_in_weekend_nights	-0.054151	0.049342
stays_in_week_nights	-0.002020	0.065237
adults	-0.008283	0.230641
children	-0.033273	0.324854
babies	-0.010621	0.029186
is_repeated_guest	-0.022235	-0.134314
previous_cancellations	0.005929	-0.065646
previous_bookings_not_canceled	-0.009397	-0.072144
booking_changes	-0.011634	0.019618
agent	-0.055151	-0.024695
company	0.000411	0.086376
days_in_waiting_list	1.000000	-0.040756
adr	-0.040756	1.000000
required_car_parking_spaces	-0.030600	0.056628
total_of_special_requests	-0.082730	0.172185

	required_car_parking_spaces \
is_canceled	-0.195498
lead_time	-0.116451
arrival_date_year	-0.013684
arrival_date_week_number	0.001920
arrival_date_day_of_month	0.008683
stays_in_weekend_nights	-0.018554
stays_in_week_nights	-0.024859
adults	0.014785
children	0.056253
babies	0.037383
is_repeated_guest	0.077090
previous_cancellations	-0.018492
previous_bookings_not_canceled	0.047653
booking_changes	0.065620
agent	0.177353
company	-0.012916
days_in_waiting_list	-0.030600
adr	0.056628
required_car_parking_spaces	1.000000
total_of_special_requests	0.082626

	total_of_special_requests
is_canceled	-0.234658
lead_time	-0.095712
arrival_date_year	0.108531
arrival_date_week_number	0.026149
arrival_date_day_of_month	0.003062
stays_in_weekend_nights	0.072671
stays_in_week_nights	0.068192
adults	0.122884
children	0.081745
babies	0.097889
is_repeated_guest	0.013050

```
previous_cancellations                    -0.048384
previous_bookings_not_canceled             0.037824
booking_changes                            0.052833
agent                                      0.034162
company                                   -0.098558
days_in_waiting_list                      -0.082730
adr                                        0.172185
required_car_parking_spaces                0.082626
total_of_special_requests                  1.000000
```

```
[73]: #                     (          )
      data.corr(method='kendall')
```

```
[73]:                                 is_canceled  lead_time  arrival_date_year  \
      is_canceled                        1.000000   0.259528           0.017181
      lead_time                          0.259528   1.000000           0.044102
      arrival_date_year                  0.017181   0.044102           1.000000
      arrival_date_week_number           0.006258   0.083628          -0.421526
      arrival_date_day_of_month         -0.005096   0.005224          -0.000917
      stays_in_weekend_nights           -0.003850   0.125971           0.022199
      stays_in_week_nights               0.036872   0.217601           0.035033
      adults                             0.065604   0.153399           0.039839
      children                          -0.002766  -0.013148           0.054570
      babies                            -0.034304  -0.016213          -0.012620
      is_repeated_guest                 -0.084793  -0.155889           0.009868
      previous_cancellations             0.269762   0.139784          -0.244617
      previous_bookings_not_canceled    -0.114679  -0.153624           0.034296
      booking_changes                   -0.181956  -0.006296           0.021101
      agent                             -0.098736  -0.086272           0.087808
      company                           -0.009430   0.190327           0.186443
      days_in_waiting_list               0.097492   0.125113          -0.078468
      adr                                0.041656   0.006938           0.172775
      required_car_parking_spaces       -0.197370  -0.116004          -0.015500
      total_of_special_requests         -0.247219  -0.057681           0.105513

                                       arrival_date_week_number  \
      is_canceled                                      0.006258
      lead_time                                        0.083628
      arrival_date_year                               -0.421526
      arrival_date_week_number                         1.000000
      arrival_date_day_of_month                        0.051529
      stays_in_weekend_nights                          0.019647
      stays_in_week_nights                             0.019194
      adults                                           0.020991
      children                                         0.005229
      babies                                           0.010343
      is_repeated_guest                               -0.025053
      previous_cancellations                           0.071557
      previous_bookings_not_canceled                  -0.035314
      booking_changes                                  0.006362
```

```
agent                                                      -0.040696
company                                                    -0.035959
days_in_waiting_list                                       -0.002911
adr                                                         0.056859
required_car_parking_spaces                                0.002588
total_of_special_requests                                  0.015370


                                 arrival_date_day_of_month  \
is_canceled                                      -0.005096
lead_time                                         0.005224
arrival_date_year                                -0.000917
arrival_date_week_number                          0.051529
arrival_date_day_of_month                         1.000000
stays_in_weekend_nights                          -0.005251
stays_in_week_nights                             -0.011498
adults                                            0.001201
children                                          0.012874
babies                                            0.000381
is_repeated_guest                                -0.005047
previous_cancellations                           -0.009897
previous_bookings_not_canceled                   -0.001137
booking_changes                                   0.010161
agent                                             0.003338
company                                           0.031391
days_in_waiting_list                              0.026518
adr                                               0.018192
required_car_parking_spaces                       0.007056
total_of_special_requests                         0.002447


                                 stays_in_weekend_nights ␣
 →stays_in_week_nights  \
is_canceled                                      -0.003850                 0.036872
lead_time                                         0.125971                 0.217601
arrival_date_year                                 0.022199                 0.035033
arrival_date_week_number                          0.019647                 0.019194
arrival_date_day_of_month                        -0.005251                -0.011498
stays_in_weekend_nights                           1.000000                 0.199208
stays_in_week_nights                              0.199208                 1.000000
adults                                            0.116289                 0.133409
children                                          0.049122                 0.047921
babies                                            0.021283                 0.023554
is_repeated_guest                                -0.091022                -0.114306
previous_cancellations                           -0.051457                -0.055306
previous_bookings_not_canceled                   -0.077926                -0.105315
booking_changes                                   0.037217                 0.056389
agent                                             0.105666                 0.132458
company                                           0.060771                 0.193980
days_in_waiting_list                             -0.069546                 0.010482
adr                                               0.039543                 0.069736
```

```
required_car_parking_spaces                      -0.017455          -0.030137
total_of_special_requests                         0.071220           0.064748


                                adults  children   babies  \
is_canceled                    0.065604 -0.002766 -0.034304
lead_time                      0.153399 -0.013148 -0.016213
arrival_date_year              0.039839  0.054570 -0.012620
arrival_date_week_number       0.020991  0.005229  0.010343
arrival_date_day_of_month      0.001201  0.012874  0.000381
stays_in_weekend_nights        0.116289  0.049122  0.021283
stays_in_week_nights           0.133409  0.047921  0.023554
adults                         1.000000  0.069921  0.027078
children                       0.069921  1.000000  0.038917
babies                         0.027078  0.038917  1.000000
is_repeated_guest             -0.173217 -0.034421 -0.009423
previous_cancellations        -0.035187 -0.058023 -0.017255
previous_bookings_not_canceled -0.203971 -0.034680 -0.011045
booking_changes               -0.081889  0.064194  0.114076
agent                         -0.046186  0.033276  0.037099
company                        0.190644  0.023117  0.016104
days_in_waiting_list          -0.035458 -0.047295 -0.014005
adr                            0.226901  0.216526  0.021362
required_car_parking_spaces    0.017529  0.060429  0.040568
total_of_special_requests      0.151581  0.090657  0.088765

                                is_repeated_guest  previous_cancellations  \
is_canceled                            -0.084793                0.269762
lead_time                              -0.155889                0.139784
arrival_date_year                       0.009868               -0.244617
arrival_date_week_number               -0.025053                0.071557
arrival_date_day_of_month              -0.005047               -0.009897
stays_in_weekend_nights                -0.091022               -0.051457
stays_in_week_nights                   -0.114306               -0.055306
adults                                 -0.173217               -0.035187
children                               -0.034421               -0.058023
babies                                 -0.009423               -0.017255
is_repeated_guest                       1.000000                0.153051
previous_cancellations                  0.153051                1.000000
previous_bookings_not_canceled          0.752639                0.100936
booking_changes                         0.018023               -0.071298
agent                                   0.024284               -0.144344
company                                -0.236411               -0.164128
days_in_waiting_list                   -0.027379                0.115208
adr                                    -0.123954               -0.122553
required_car_parking_spaces             0.075306               -0.043794
total_of_special_requests               0.005285               -0.123605

                                previous_bookings_not_canceled  \
is_canceled                                          -0.114679
lead_time                                            -0.153624
```

arrival_date_year	0.034296
arrival_date_week_number	-0.035314
arrival_date_day_of_month	-0.001137
stays_in_weekend_nights	-0.077926
stays_in_week_nights	-0.105315
adults	-0.203971
children	-0.034680
babies	-0.011045
is_repeated_guest	0.752639
previous_cancellations	0.100936
previous_bookings_not_canceled	1.000000
booking_changes	0.029975
agent	0.051361
company	-0.233946
days_in_waiting_list	-0.018612
adr	-0.116122
required_car_parking_spaces	0.103292
total_of_special_requests	0.023779

	booking_changes	agent	company \
is_canceled	-0.181956	-0.098736	-0.009430
lead_time	-0.006296	-0.086272	0.190327
arrival_date_year	0.021101	0.087808	0.186443
arrival_date_week_number	0.006362	-0.040696	-0.035959
arrival_date_day_of_month	0.010161	0.003338	0.031391
stays_in_weekend_nights	0.037217	0.105666	0.060771
stays_in_week_nights	0.056389	0.132458	0.193980
adults	-0.081889	-0.046186	0.190644
children	0.064194	0.033276	0.023117
babies	0.114076	0.037099	0.016104
is_repeated_guest	0.018023	0.024284	-0.236411
previous_cancellations	-0.071298	-0.144344	-0.164128
previous_bookings_not_canceled	0.029975	0.051361	-0.233946
booking_changes	1.000000	0.076815	0.141445
agent	0.076815	1.000000	0.195365
company	0.141445	0.195365	1.000000
days_in_waiting_list	-0.018492	-0.016235	0.017523
adr	0.004113	-0.034282	0.041573
required_car_parking_spaces	0.074363	0.141514	-0.019806
total_of_special_requests	0.039384	0.014214	-0.103073

	days_in_waiting_list	adr \
is_canceled	0.097492	0.041656
lead_time	0.125113	0.006938
arrival_date_year	-0.078468	0.172775
arrival_date_week_number	-0.002911	0.056859
arrival_date_day_of_month	0.026518	0.018192
stays_in_weekend_nights	-0.069546	0.039543
stays_in_week_nights	0.010482	0.069736
adults	-0.035458	0.226901

```
children                         -0.047295  0.216526
babies                           -0.014005  0.021362
is_repeated_guest                -0.027379 -0.123954
previous_cancellations            0.115208 -0.122553
previous_bookings_not_canceled   -0.018612 -0.116122
booking_changes                  -0.018492  0.004113
agent                            -0.016235 -0.034282
company                           0.017523  0.041573
days_in_waiting_list              1.000000 -0.032182
adr                              -0.032182  1.000000
required_car_parking_spaces      -0.043070  0.026778
total_of_special_requests        -0.116990  0.154523


                                required_car_parking_spaces  \
is_canceled                                       -0.197370
lead_time                                         -0.116004
arrival_date_year                                 -0.015500
arrival_date_week_number                           0.002588
arrival_date_day_of_month                          0.007056
stays_in_weekend_nights                           -0.017455
stays_in_week_nights                              -0.030137
adults                                             0.017529
children                                           0.060429
babies                                             0.040568
is_repeated_guest                                  0.075306
previous_cancellations                            -0.043794
previous_bookings_not_canceled                     0.103292
booking_changes                                    0.074363
agent                                              0.141514
company                                           -0.019806
days_in_waiting_list                              -0.043070
adr                                                0.026778
required_car_parking_spaces                        1.000000
total_of_special_requests                          0.083756


                                total_of_special_requests
is_canceled                                     -0.247219
lead_time                                       -0.057681
arrival_date_year                                0.105513
arrival_date_week_number                         0.015370
arrival_date_day_of_month                        0.002447
stays_in_weekend_nights                          0.071220
stays_in_week_nights                             0.064748
adults                                           0.151581
children                                         0.090657
babies                                           0.088765
is_repeated_guest                                0.005285
previous_cancellations                          -0.123605
previous_bookings_not_canceled                   0.023779
booking_changes                                  0.039384
```

```
agent                                                        0.014214
company                                                     -0.103073
days_in_waiting_list                                        -0.116990
adr                                                          0.154523
required_car_parking_spaces                                  0.083756
total_of_special_requests                                    1.000000
```

[74]:
```python
#                        (        )
data.corr(method='spearman')
```

[74]:
```
                                 is_canceled   lead_time   arrival_date_year  \
is_canceled                         1.000000    0.316635            0.018066
lead_time                           0.316635    1.000000            0.056649
arrival_date_year                   0.018066    0.056649            1.000000
arrival_date_week_number            0.007589    0.112510           -0.544817
arrival_date_day_of_month          -0.006142    0.007539           -0.001182
stays_in_weekend_nights            -0.004106    0.162115            0.024804
stays_in_week_nights                0.041418    0.296345            0.041300
adults                              0.067027    0.192243            0.042868
children                           -0.002791   -0.016159            0.057876
babies                             -0.034306   -0.019782           -0.013271
is_repeated_guest                  -0.084793   -0.190190            0.010377
previous_cancellations              0.270233    0.170802           -0.257675
previous_bookings_not_canceled     -0.115354   -0.188610            0.036274
booking_changes                    -0.185107   -0.007772            0.022565
agent                              -0.114970   -0.123380            0.107196
company                            -0.011338    0.285991            0.234352
days_in_waiting_list                0.098237    0.153212           -0.083059
adr                                 0.050876    0.015034            0.219556
required_car_parking_spaces        -0.197397   -0.141545           -0.016301
total_of_special_requests          -0.258520   -0.074107            0.115600

                                arrival_date_week_number  \
is_canceled                                     0.007589
lead_time                                       0.112510
arrival_date_year                              -0.544817
arrival_date_week_number                        1.000000
arrival_date_day_of_month                       0.060750
stays_in_weekend_nights                         0.025602
stays_in_week_nights                            0.025902
adults                                          0.026321
children                                        0.006415
babies                                          0.012543
is_repeated_guest                              -0.030379
previous_cancellations                          0.086918
previous_bookings_not_canceled                 -0.043140
booking_changes                                 0.007861
agent                                          -0.057070
company                                        -0.057974
days_in_waiting_list                           -0.003535
```

```
adr                                                     0.073624
required_car_parking_spaces                             0.003139
total_of_special_requests                               0.019054


                                arrival_date_day_of_month  \
is_canceled                                    -0.006142
lead_time                                       0.007539
arrival_date_year                              -0.001182
arrival_date_week_number                        0.060750
arrival_date_day_of_month                       1.000000
stays_in_weekend_nights                        -0.006722
stays_in_week_nights                           -0.015509
adults                                          0.001524
children                                        0.015654
babies                                          0.000459
is_repeated_guest                              -0.006083
previous_cancellations                         -0.011936
previous_bookings_not_canceled                 -0.001378
booking_changes                                 0.012459
agent                                           0.004757
company                                         0.045510
days_in_waiting_list                            0.032205
adr                                             0.026749
required_car_parking_spaces                     0.008505
total_of_special_requests                       0.003087


                                stays_in_weekend_nights  ␣
 ↪stays_in_week_nights  \
is_canceled                                   -0.004106                  0.041418
lead_time                                      0.162115                  0.296345
arrival_date_year                              0.024804                  0.041300
arrival_date_week_number                       0.025602                  0.025902
arrival_date_day_of_month                     -0.006722                 -0.015509
stays_in_weekend_nights                        1.000000                  0.238053
stays_in_week_nights                           0.238053                  1.000000
adults                                         0.126755                  0.152956
children                                       0.052843                  0.054301
babies                                         0.022700                  0.026459
is_repeated_guest                             -0.097072                 -0.128396
previous_cancellations                        -0.054980                 -0.062174
previous_bookings_not_canceled                -0.083599                 -0.119101
booking_changes                                0.040368                  0.064484
agent                                          0.131403                  0.170419
company                                        0.076191                  0.249866
days_in_waiting_list                          -0.074748                  0.011745
adr                                            0.051365                  0.093795
required_car_parking_spaces                   -0.018618                 -0.033855
total_of_special_requests                      0.079380                  0.076226
```

	adults	children	babies
is_canceled	0.067027	-0.002791	-0.034306
lead_time	0.192243	-0.016159	-0.019782
arrival_date_year	0.042868	0.057876	-0.013271
arrival_date_week_number	0.026321	0.006415	0.012543
arrival_date_day_of_month	0.001524	0.015654	0.000459
stays_in_weekend_nights	0.126755	0.052843	0.022700
stays_in_week_nights	0.152956	0.054301	0.026459
adults	1.000000	0.072101	0.027667
children	0.072101	1.000000	0.039268
babies	0.027667	0.039268	1.000000
is_repeated_guest	-0.176972	-0.034728	-0.009424
previous_cancellations	-0.035992	-0.058644	-0.017286
previous_bookings_not_canceled	-0.209617	-0.035196	-0.011111
booking_changes	-0.084991	0.065886	0.116058
agent	-0.055951	0.039214	0.043202
company	0.230412	0.027799	0.019361
days_in_waiting_list	-0.036534	-0.048082	-0.014113
adr	0.279769	0.265465	0.026092
required_car_parking_spaces	0.017911	0.060977	0.040576
total_of_special_requests	0.161561	0.095661	0.092828

	is_repeated_guest	previous_cancellations
is_canceled	-0.084793	0.270233
lead_time	-0.190190	0.170802
arrival_date_year	0.010377	-0.257675
arrival_date_week_number	-0.030379	0.086918
arrival_date_day_of_month	-0.006083	-0.011936
stays_in_weekend_nights	-0.097072	-0.054980
stays_in_week_nights	-0.128396	-0.062174
adults	-0.176972	-0.035992
children	-0.034728	-0.058644
babies	-0.009424	-0.017286
is_repeated_guest	1.000000	0.153318
previous_cancellations	0.153318	1.000000
previous_bookings_not_canceled	0.757075	0.101675
booking_changes	0.018335	-0.072662
agent	0.028277	-0.168175
company	-0.284222	-0.198182
days_in_waiting_list	-0.027589	0.116301
adr	-0.151390	-0.149843
required_car_parking_spaces	0.075316	-0.043876
total_of_special_requests	0.005527	-0.129446

	previous_bookings_not_canceled
is_canceled	-0.115354
lead_time	-0.188610
arrival_date_year	0.036274
arrival_date_week_number	-0.043140
arrival_date_day_of_month	-0.001378

stays_in_weekend_nights	-0.083599
stays_in_week_nights	-0.119101
adults	-0.209617
children	-0.035196
babies	-0.011111
is_repeated_guest	0.757075
previous_cancellations	0.101675
previous_bookings_not_canceled	1.000000
booking_changes	0.030677
agent	0.059920
company	-0.297663
days_in_waiting_list	-0.018865
adr	-0.142782
required_car_parking_spaces	0.103915
total_of_special_requests	0.025015

	booking_changes	agent	company \
is_canceled	-0.185107	-0.114970	-0.011338
lead_time	-0.007772	-0.123380	0.285991
arrival_date_year	0.022565	0.107196	0.234352
arrival_date_week_number	0.007861	-0.057070	-0.057974
arrival_date_day_of_month	0.012459	0.004757	0.045510
stays_in_weekend_nights	0.040368	0.131403	0.076191
stays_in_week_nights	0.064484	0.170419	0.249866
adults	-0.084991	-0.055951	0.230412
children	0.065886	0.039214	0.027799
babies	0.116058	0.043202	0.019361
is_repeated_guest	0.018335	0.028277	-0.284222
previous_cancellations	-0.072662	-0.168175	-0.198182
previous_bookings_not_canceled	0.030677	0.059920	-0.297663
booking_changes	1.000000	0.090987	0.176117
agent	0.090987	1.000000	0.225689
company	0.176117	0.225689	1.000000
days_in_waiting_list	-0.018956	-0.018720	0.021080
adr	0.005229	-0.048975	0.052280
required_car_parking_spaces	0.075660	0.164802	-0.023819
total_of_special_requests	0.041908	0.015450	-0.127763

	days_in_waiting_list	adr \
is_canceled	0.098237	0.050876
lead_time	0.153212	0.015034
arrival_date_year	-0.083059	0.219556
arrival_date_week_number	-0.003535	0.073624
arrival_date_day_of_month	0.032205	0.026749
stays_in_weekend_nights	-0.074748	0.051365
stays_in_week_nights	0.011745	0.093795
adults	-0.036534	0.279769
children	-0.048082	0.265465
babies	-0.014113	0.026092
is_repeated_guest	-0.027589	-0.151390

```
previous_cancellations                          0.116301 -0.149843
previous_bookings_not_canceled                 -0.018865 -0.142782
booking_changes                                -0.018956  0.005229
agent                                          -0.018720 -0.048975
company                                         0.021080  0.052280
days_in_waiting_list                            1.000000 -0.039523
adr                                            -0.039523  1.000000
required_car_parking_spaces                    -0.043405  0.032706
total_of_special_requests                      -0.123282  0.196405

                                required_car_parking_spaces  \
is_canceled                                       -0.197397
lead_time                                         -0.141545
arrival_date_year                                 -0.016301
arrival_date_week_number                           0.003139
arrival_date_day_of_month                          0.008505
stays_in_weekend_nights                           -0.018618
stays_in_week_nights                              -0.033855
adults                                             0.017911
children                                           0.060977
babies                                             0.040576
is_repeated_guest                                  0.075316
previous_cancellations                            -0.043876
previous_bookings_not_canceled                     0.103915
booking_changes                                    0.075660
agent                                              0.164802
company                                           -0.023819
days_in_waiting_list                              -0.043405
adr                                                0.032706
required_car_parking_spaces                        1.000000
total_of_special_requests                          0.087596

                                total_of_special_requests
is_canceled                                       -0.258520
lead_time                                         -0.074107
arrival_date_year                                  0.115600
arrival_date_week_number                           0.019054
arrival_date_day_of_month                          0.003087
stays_in_weekend_nights                            0.079380
stays_in_week_nights                               0.076226
adults                                             0.161561
children                                           0.095661
babies                                             0.092828
is_repeated_guest                                  0.005527
previous_cancellations                            -0.129446
previous_bookings_not_canceled                     0.025015
booking_changes                                    0.041908
agent                                              0.015450
company                                           -0.127763
days_in_waiting_list                              -0.123282
```

```
adr                                                    0.196405
required_car_parking_spaces                            0.087596
total_of_special_requests                              1.000000
```
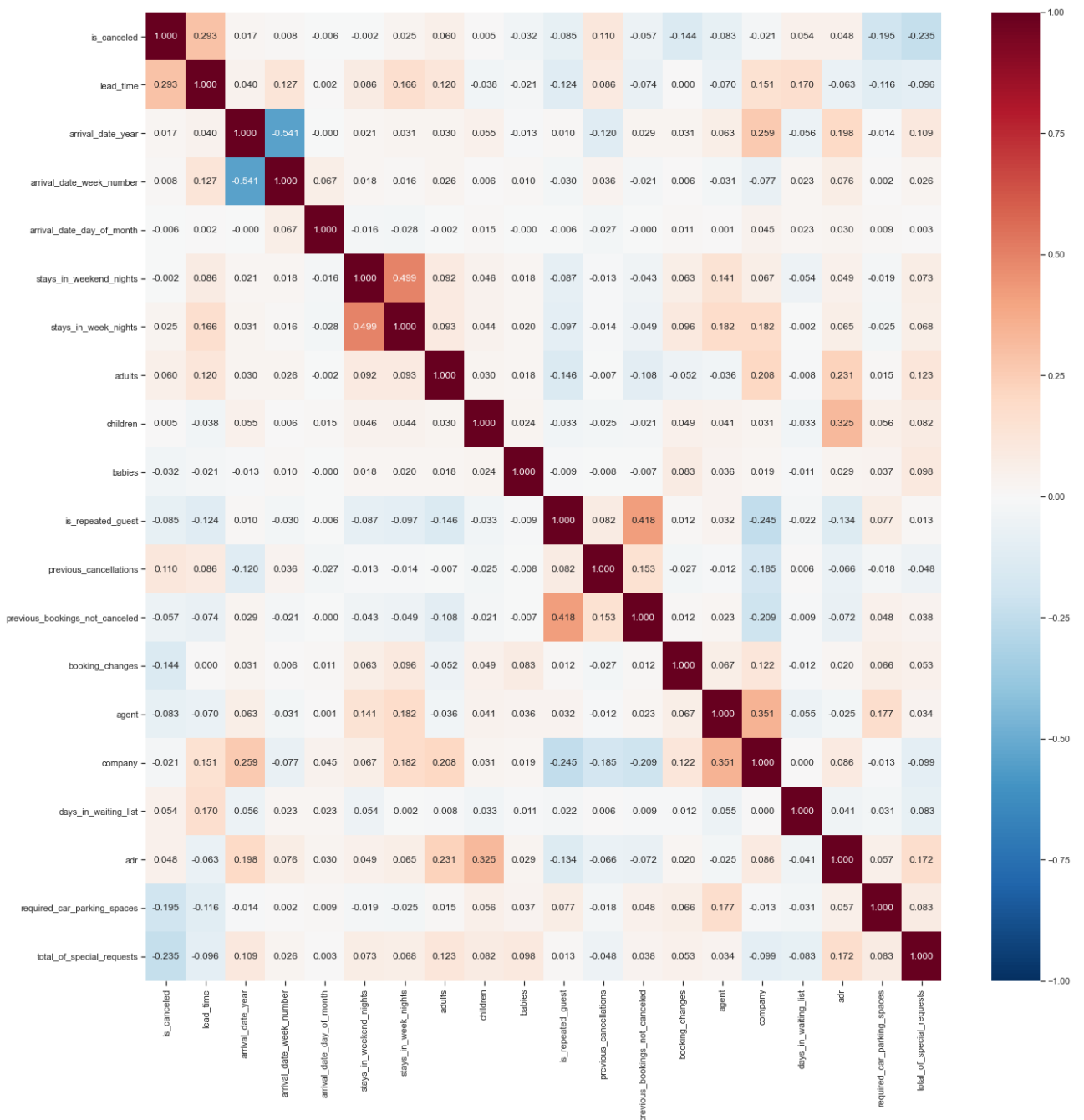
[91]:
```python
#
plt.figure(figsize=(22,22))
sns.heatmap(data.corr(), cmap=sns.color_palette("RdBu_r", 1000), vmin=-1,
 center=0, annot=True, fmt='.3f')
```

[91]: <matplotlib.axes._subplots.AxesSubplot at 0x1e4e78da0>

[ ]: