Seattle AirBnB Analysis

May 25, 2020

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

0.1 Load the Data

The data for the analysis was obtained from the Kaggle: https://www.kaggle.com/airbnb/seattle/data

The data is broken into 3 datasets: - Listings - includes full descriptions and average review score - Reviews - includes unique id for each reviewer and detailed comments - Calendar - includes listing id and the price and availability for that day

```
[149]: df_reviews = pd.read_csv ("data/reviews.csv")
       df_reviews.head()
```

```
[149]:    listing_id        id        date  reviewer_id reviewer_name  \
       0     7202016  38917982  2015-07-19     28943674        Bianca
       1     7202016  39087409  2015-07-20     32440555         Frank
       2     7202016  39820030  2015-07-26     37722850           Ian
       3     7202016  40813543  2015-08-02     33671805        George
       4     7202016  41986501  2015-08-10     34959538          Ming

                                                   comments
       0  Cute and cozy place. Perfect location to every…
       1  Kelly has a great room in a very central locat…
       2  Very spacious apartment, and in a great neighb…
       3  Close to Seattle Center and all it has to offe…
       4  Kelly was a great host and very accommodating …
```

```
[150]: df_listings = pd.read_csv ("data/listings.csv")
       df_listings.head()
```

```
[150]:         id                            listing_url       scrape_id last_scraped  \
       0   241032   https://www.airbnb.com/rooms/241032  20160104002432   2016-01-04
       1   953595   https://www.airbnb.com/rooms/953595  20160104002432   2016-01-04
       2  3308979  https://www.airbnb.com/rooms/3308979  20160104002432   2016-01-04
```

```
3  7421966  https://www.airbnb.com/rooms/7421966  20160104002432   2016-01-04
4   278830   https://www.airbnb.com/rooms/278830  20160104002432   2016-01-04

                                  name  \
0         Stylish Queen Anne Apartment
1   Bright & Airy Queen Anne Apartment
2  New Modern House-Amazing water view
3                   Queen Anne Chateau
4       Charming craftsman 3 bdm house

                                             summary  \
0                                                NaN
1  Chemically sensitive? We've removed the irrita…
2  New modern house built in 2013.  Spectacular s…
3  A charming apartment that sits atop Queen Anne…
4  Cozy family craftman house in beautiful neighb…

                                               space  \
0  Make your self at home in this charming one-be…
1  Beautiful, hypoallergenic apartment in an extr…
2  Our house is modern, light and fresh with a wa…
3                                                NaN
4  Cozy family craftman house in beautiful neighb…

                                         description experiences_offered  \
0  Make your self at home in this charming one-be…                none
1  Chemically sensitive? We've removed the irrita…                none
2  New modern house built in 2013.  Spectacular s…                none
3  A charming apartment that sits atop Queen Anne…                none
4  Cozy family craftman house in beautiful neighb…                none

                               neighborhood_overview  … review_scores_value  \
0                                                NaN  …                10.0
1  Queen Anne is a wonderful, truly functional vi…  …                10.0
2  Upper Queen Anne is a charming neighborhood fu…  …                10.0
3                                                NaN  …                 NaN
4  We are in the beautiful neighborhood of Queen …  …                 9.0

  requires_license license jurisdiction_names instant_bookable  \
0                f     NaN         WASHINGTON                f
1                f     NaN         WASHINGTON                f
2                f     NaN         WASHINGTON                f
3                f     NaN         WASHINGTON                f
4                f     NaN         WASHINGTON                f

  cancellation_policy  require_guest_profile_picture  \
0            moderate                              f
```

```
1              strict                             t
2              strict                             f
3            flexible                             f
4              strict                             f

  require_guest_phone_verification calculated_host_listings_count  \
0                                f                              2
1                                t                              6
2                                f                              2
3                                f                              1
4                                f                              1

  reviews_per_month
0             4.07
1             1.48
2             1.15
3              NaN
4             0.89

[5 rows x 92 columns]
```

[151]:
```
df_calendar= pd.read_csv ("data/calendar.csv")
df_calendar.head()
```

[151]:
```
   listing_id        date available   price
0      241032  2016-01-04         t  $85.00
1      241032  2016-01-05         t  $85.00
2      241032  2016-01-06         f     NaN
3      241032  2016-01-07         f     NaN
4      241032  2016-01-08         f     NaN
```

[152]:
```
df_calendar.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1393570 entries, 0 to 1393569
Data columns (total 4 columns):
 #   Column      Non-Null Count    Dtype
---  ------      --------------    -----
 0   listing_id  1393570 non-null  int64
 1   date        1393570 non-null  object
 2   available   1393570 non-null  object
 3   price       934542 non-null   object
dtypes: int64(1), object(3)
memory usage: 42.5+ MB
```

[153]:
```
# Convert date from string to datetime
df_calendar.date = pd.to_datetime(df_calendar.date)
```

```
# Create a feature for the month of the date field
df_calendar ["month"] = pd.DatetimeIndex(df_calendar.date).month
```

0.2 Explore Date Ranges

- Examine the earliest date in the dataset
- Examine the latest date in the dataset
- Calculate the number of days in the dataset

```
[154]: df_calendar.date.min()
```

```
[154]: Timestamp('2016-01-04 00:00:00')
```

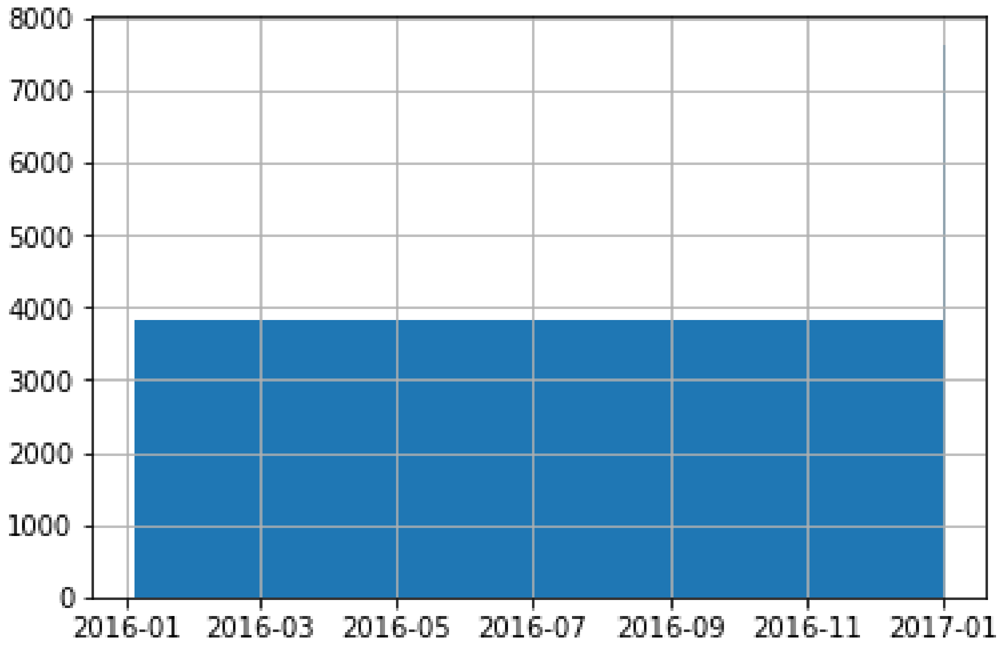
```
[155]: df_calendar.date.max()
```

```
[155]: Timestamp('2017-01-02 00:00:00')
```

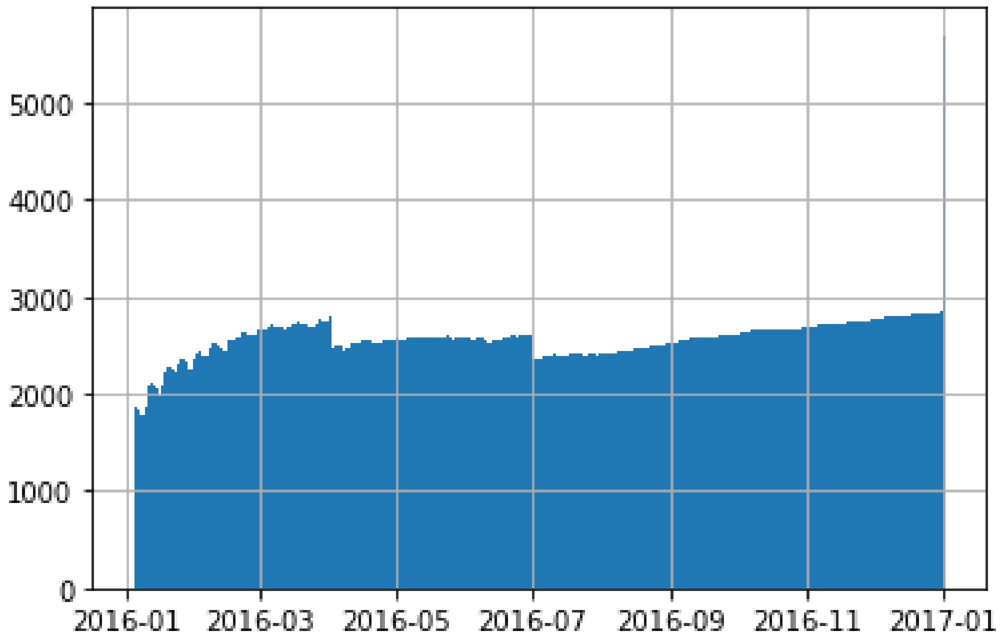
```
[156]: num_days_in_dataset = (df_calendar.date.max()-df_calendar.date.min()).days
        num_days_in_dataset
```

```
[156]: 364
```

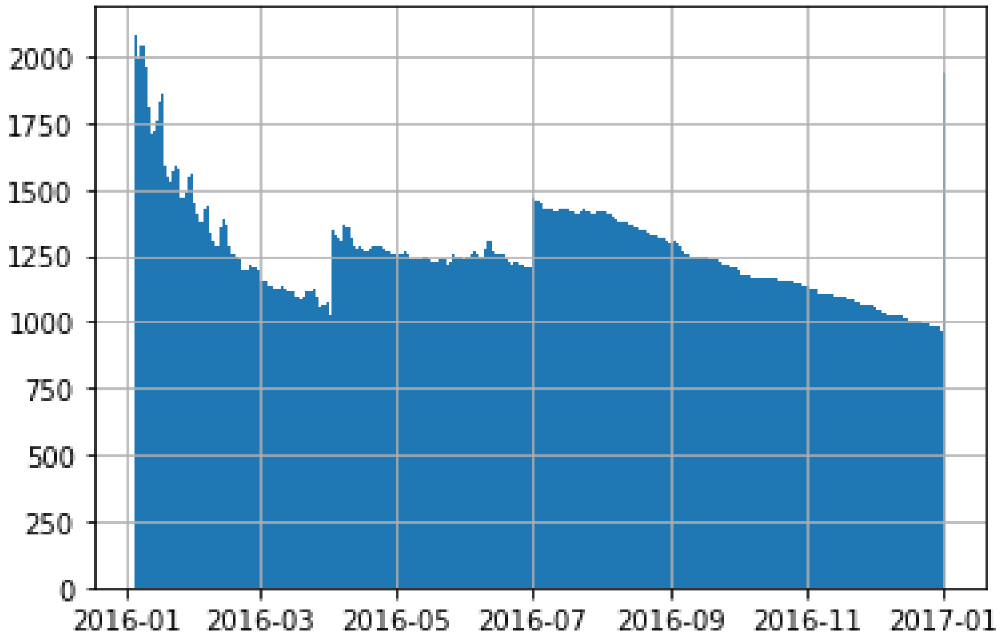
```
[157]: #View the number of listings
        df_calendar.date.hist(bins=num_days_in_dataset);
```



[158]:
```
#View the number of listings that are available
df_calendar.query("available=='t'").date.hist(bins=num_days_in_dataset);
```



[159]:
```
#View number of listings that are not available
df_calendar.query("available=='f'").date.hist(bins=num_days_in_dataset);
```



```
[160]: #Calculate percentage of data with no price
       df_calendar.price.count()/(df_calendar.price.isna().sum() + df_calendar.price.
        ↪count()) * 100
```

```
[160]: 67.06100160020667
```

```
[161]: # Drop rows with no price data
       df_calendar = df_calendar.dropna()
```

```
[162]: df_calendar.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 934542 entries, 0 to 1393213
Data columns (total 5 columns):
 #   Column      Non-Null Count   Dtype
---  ------      --------------   -----
 0   listing_id  934542 non-null  int64
 1   date        934542 non-null  datetime64[ns]
 2   available   934542 non-null  object
 3   price       934542 non-null  object
 4   month       934542 non-null  int64
dtypes: datetime64[ns](1), int64(2), object(2)
memory usage: 42.8+ MB
```

```
[163]: df_calendar.price.str[1:].replace (",","")
```

```
[163]: 0          85.00
       1          85.00
       9          85.00
       10         85.00
       14         85.00
                  …
       1393207    87.00
       1393208    87.00
       1393211    87.00
       1393212    87.00
       1393213    87.00
       Name: price, Length: 934542, dtype: object
```

```
[164]: df_calendar["price_numerical"] = df_calendar.price.str[1:].str.replace (",","").
        ↪astype(float)
```

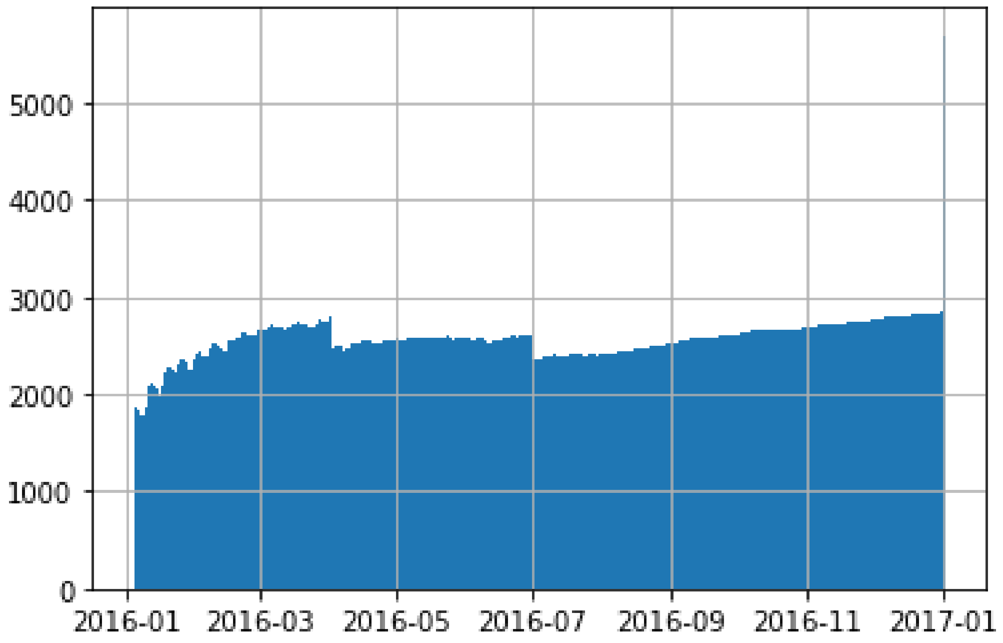
```
[165]: df_calendar.describe()
```

```
[165]:          listing_id          month  price_numerical
       count  9.345420e+05  934542.000000    934542.000000
```

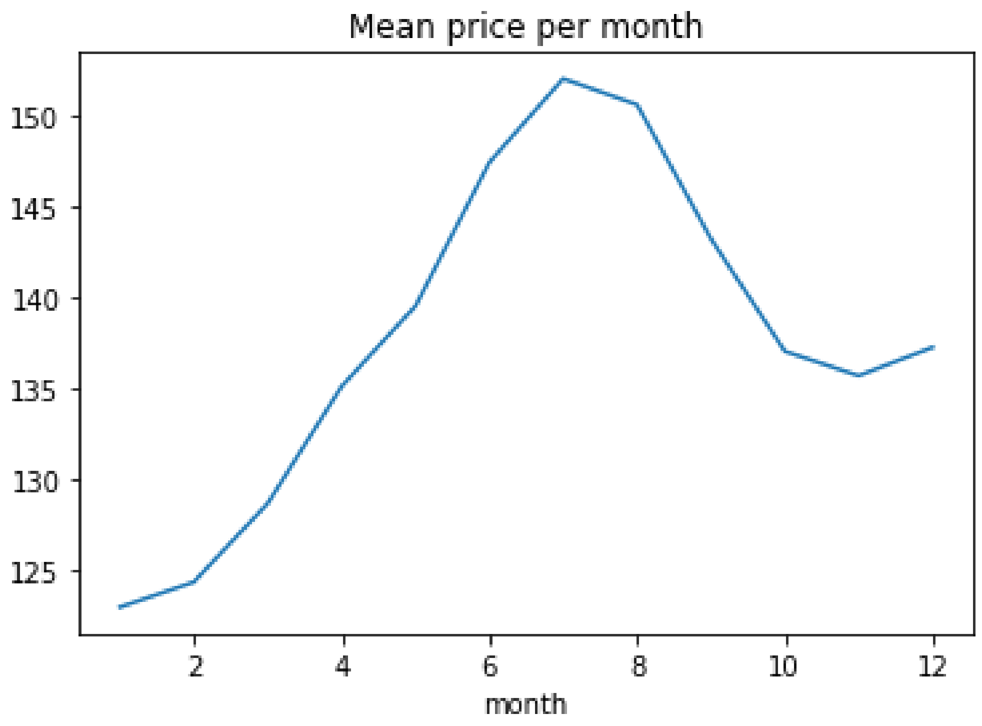
```
mean   5.305517e+06      6.661120      137.944859
std    2.974821e+06      3.446401      105.062870
min    3.335000e+03      1.000000       10.000000
25%    2.875975e+06      4.000000       75.000000
50%    5.615620e+06      7.000000      109.000000
75%    7.873345e+06     10.000000      160.000000
max    1.034016e+07     12.000000     1650.000000
```

0.3 Explore the data

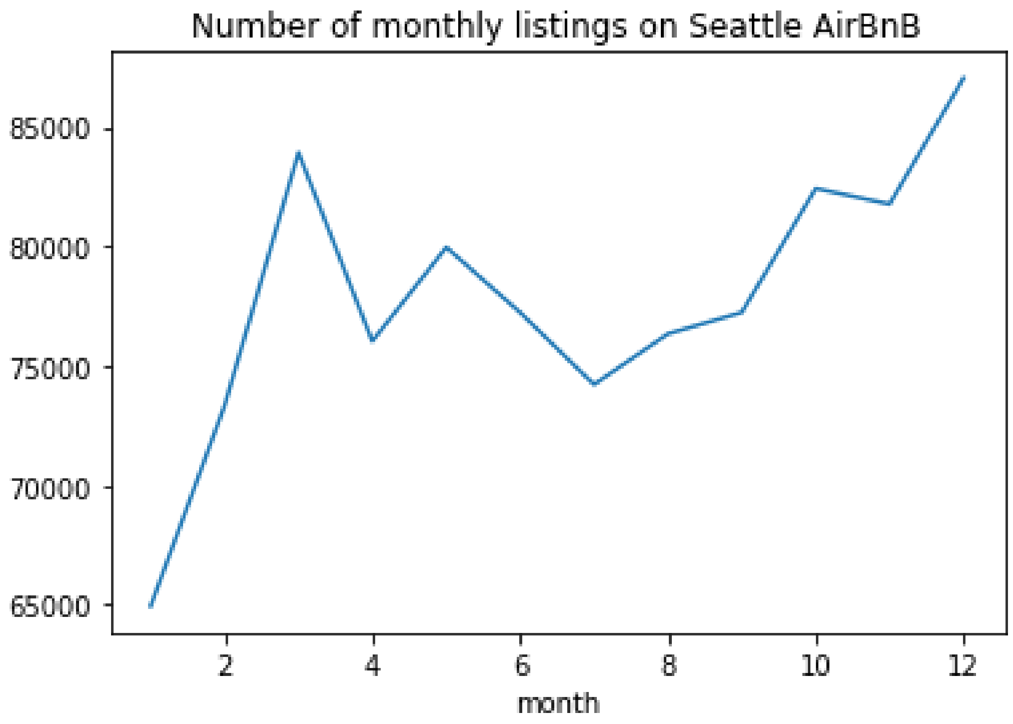
[166]:
```
#View number of daily listings
df_calendar.date.hist(bins=num_days_in_dataset);
```



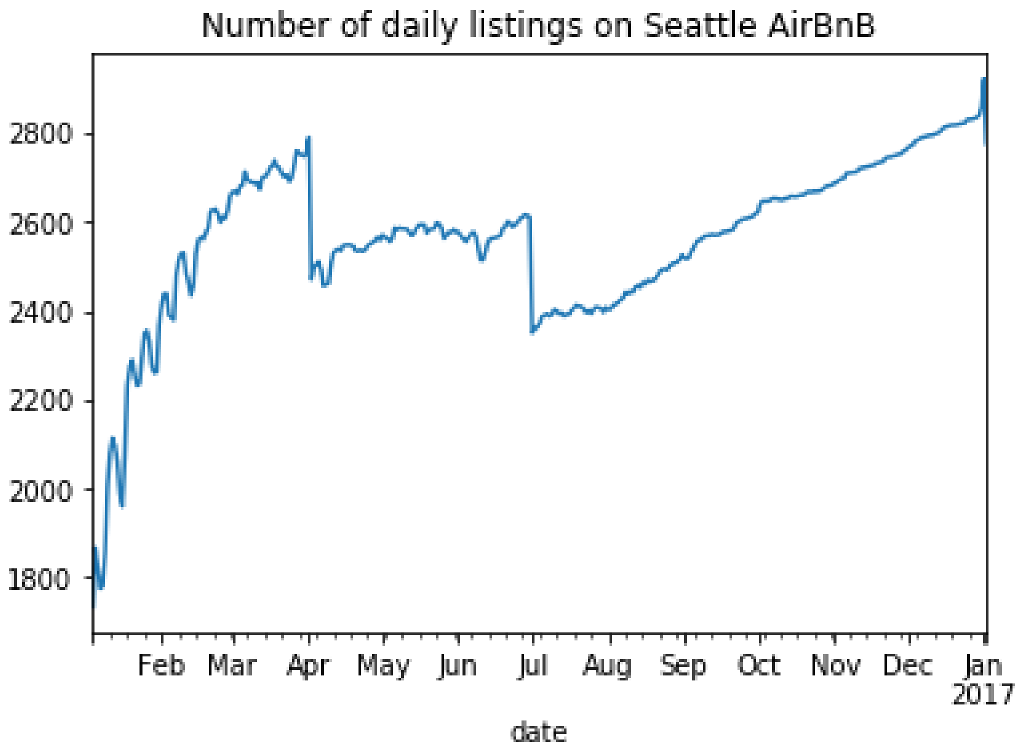
[167]:
```
# View average price per month
df_calendar.groupby("month").price_numerical.mean().plot(title="Mean price per␣
 ↪month");
```



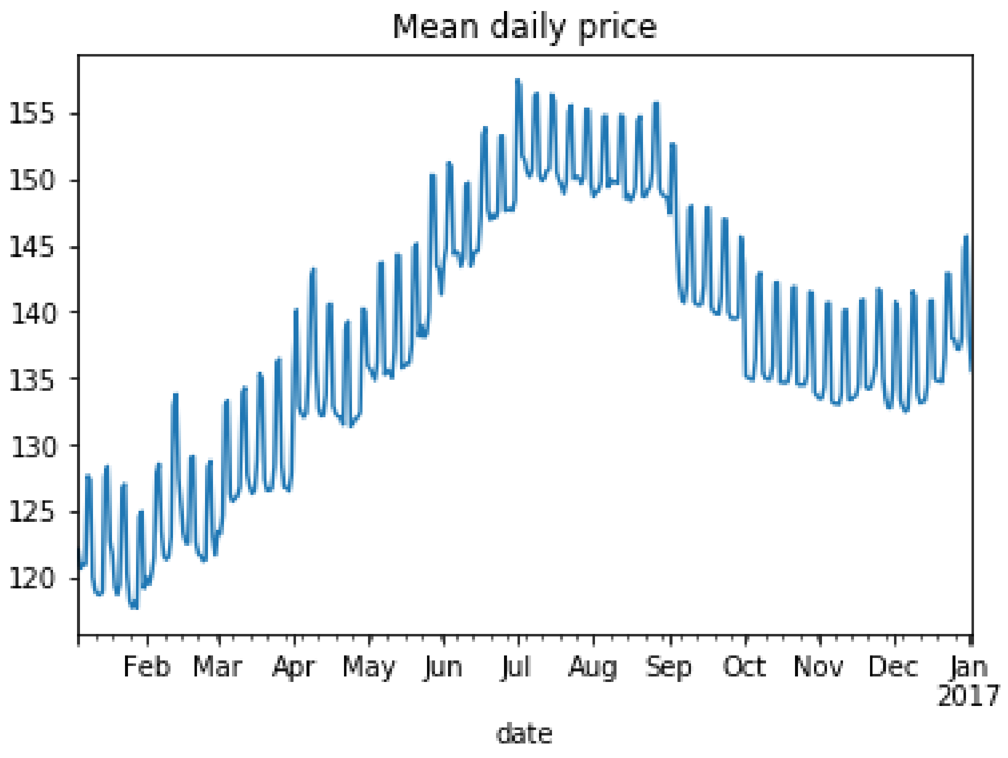
```
[168]: df_calendar.groupby("month").count().price.plot(title = "Number of monthly␣
        ↪listings on Seattle AirBnB");
```



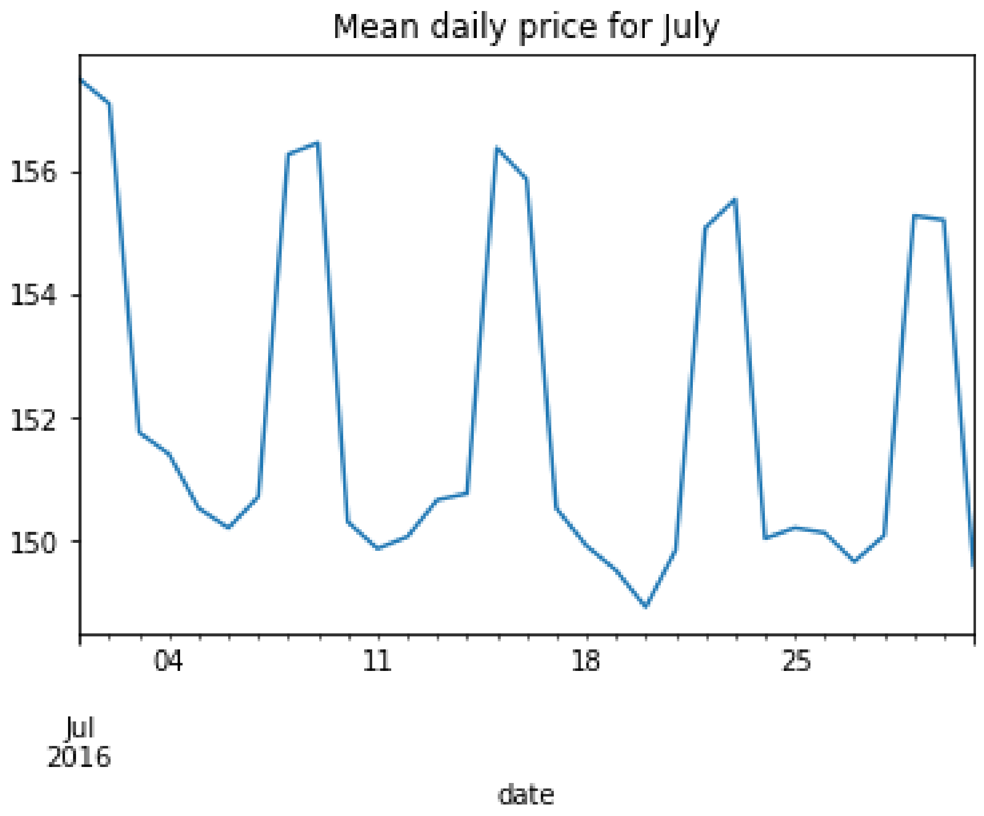
[169]:
```
df_calendar.groupby("date").count().price.plot(title = "Number of daily␣
↪listings on Seattle AirBnB");
```



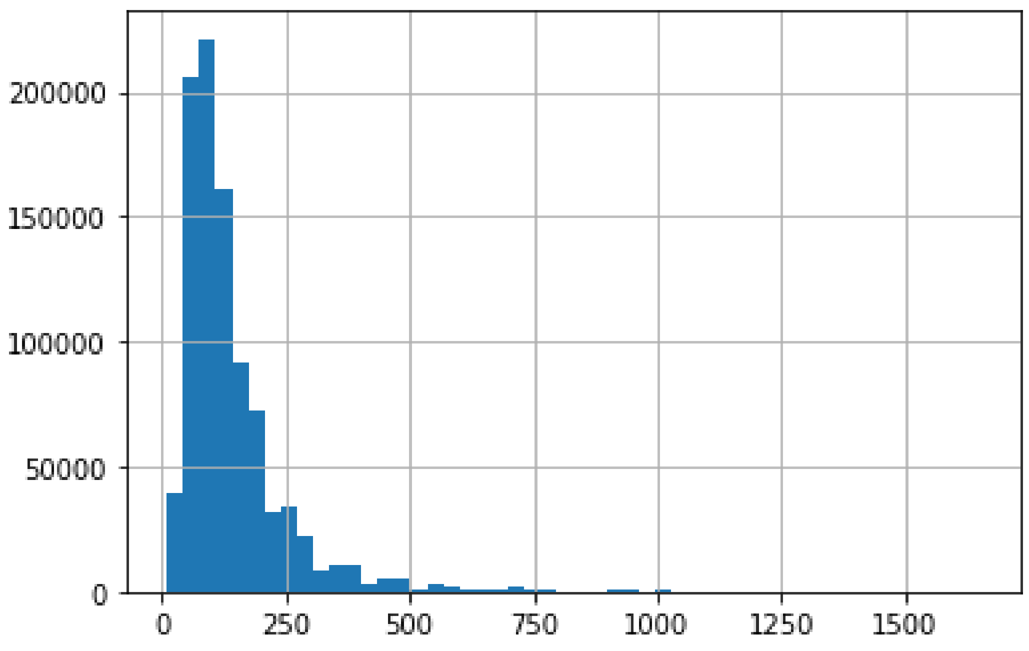
[170]:
```
df_calendar.groupby("date").price_numerical.mean().plot(title = ("Mean daily␣
↪price"));
```



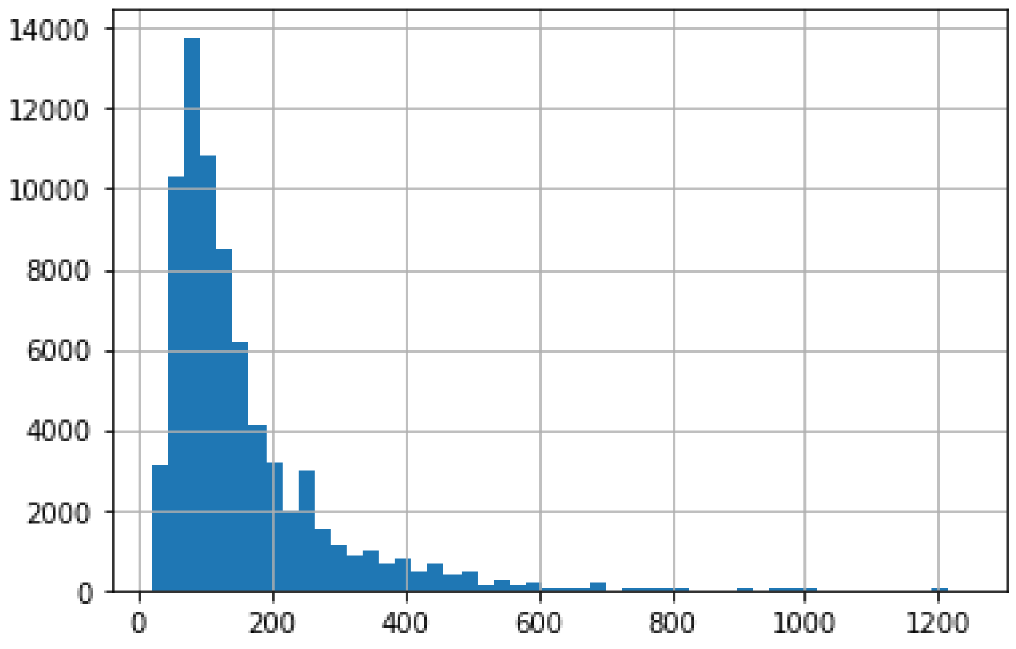
```
[171]: df_calendar.query("month==7").groupby("date").price_numerical.mean().plot(title␣
        ↪= ("Mean daily price for July"));
```



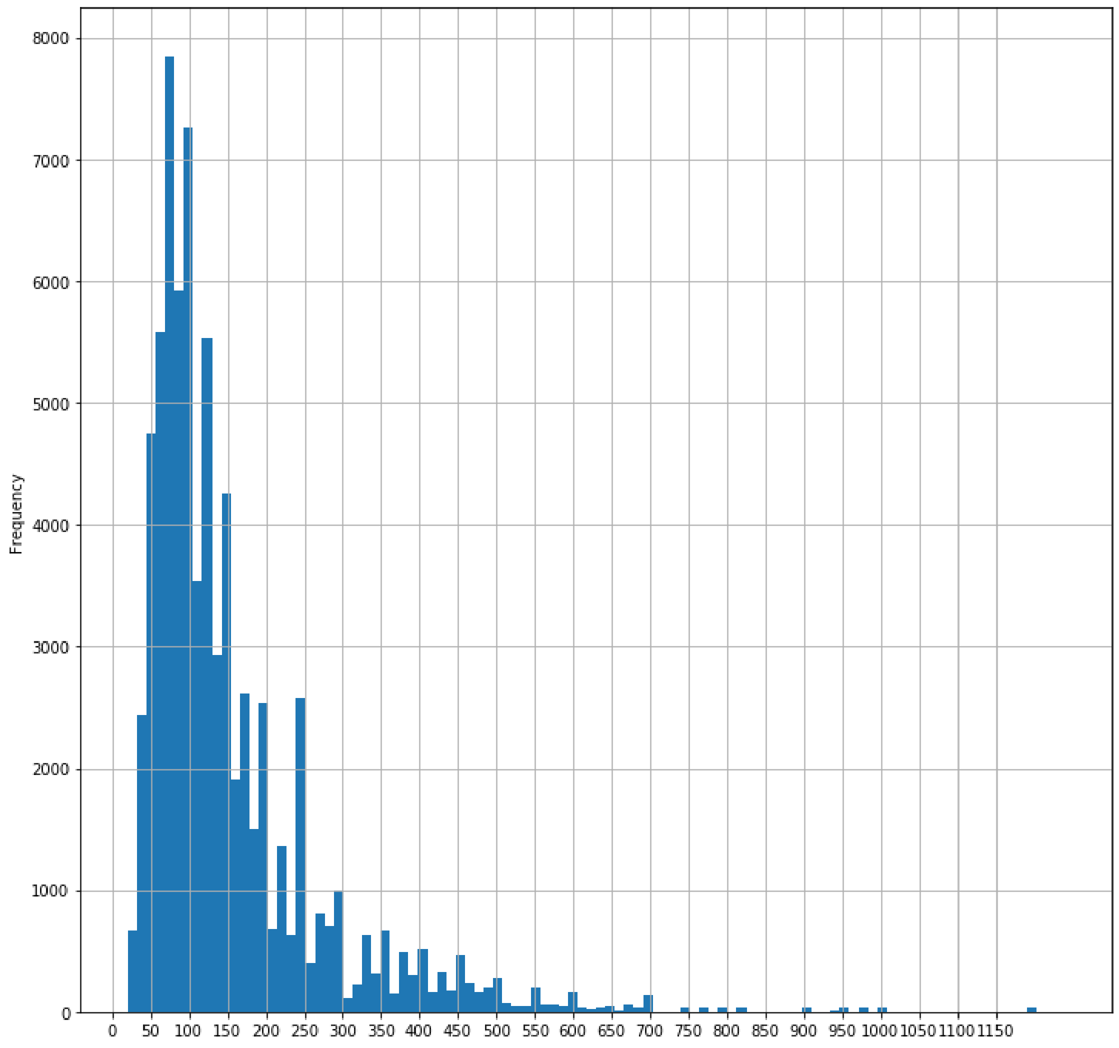
[172]:
```
#View price breakdowns
df_calendar.price_numerical.hist(bins=50);
```



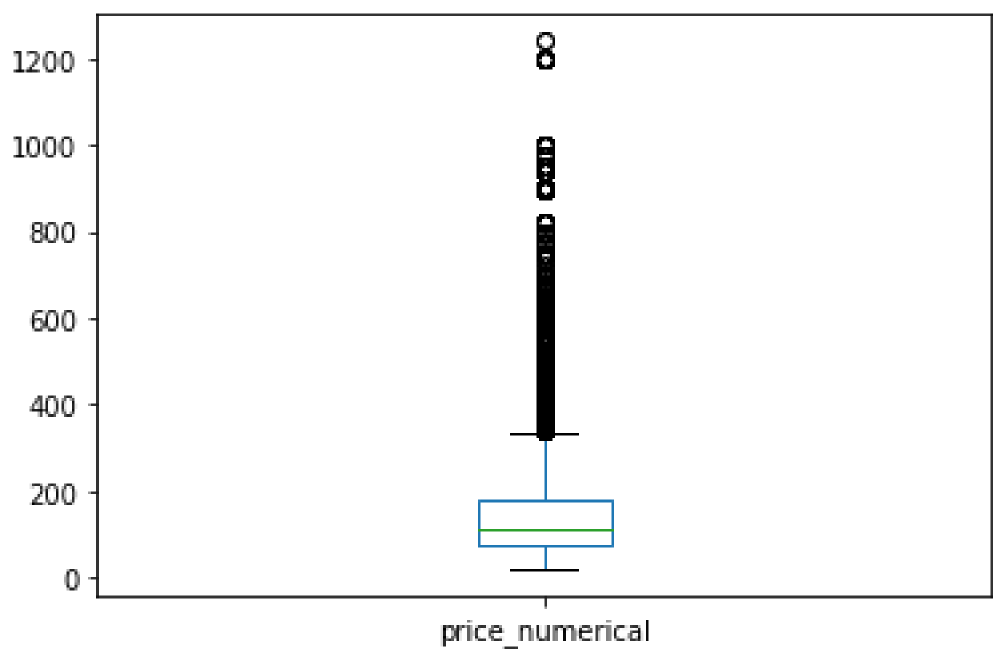
[173]:
```
#View price breakdowns for July
df_calendar.query("month==7").price_numerical.hist(bins=50);
```



[174]:
```
#View price breakdowns for July
df_calendar.query("month==7").price_numerical.plot(kind="hist", bins=100,␣
↪xticks = np.arange(0, 1200, step=50), figsize = (12,12), grid = True);
```



```
[175]: #View price breakdowns
       df_calendar.query("month==7").price_numerical.plot(kind="box");
```


1200
1000
800
600
400
200
0
price_numerical

```
[ ]:
```