

Time Series

```
In [227]: ▶ import numpy as np  
import pandas as pd  
import matplotlib.pyplot as plt
```

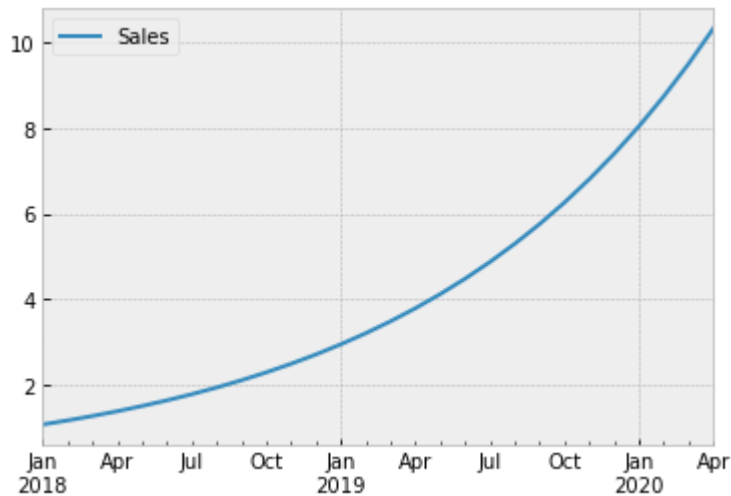
```
In [228]: ▶ from datetime import datetime
```

```
In [229]: ▶ i = pd.date_range('2018-01-31', '2020-4-30', freq='M')  
  
s = [np.exp( k/12 ) for k in range(1, len(i)+1)]  
  
df = pd.DataFrame(s, columns=['Sales'], index=i)  
df
```

Out[229]:

	Sales
2018-01-31	1.086904
2018-02-28	1.181360
2018-03-31	1.284025
2018-04-30	1.395612
2018-05-31	1.516897
2018-06-30	1.648721
2018-07-31	1.792002
2018-08-31	1.947734
2018-09-30	2.117000
2018-10-31	2.300976
2018-11-30	2.500940
2018-12-31	2.718282
2019-01-31	2.954512
2019-02-28	3.211271
2019-03-31	3.490343
2019-04-30	3.793668
2019-05-31	4.123353
2019-06-30	4.481689
2019-07-31	4.871166
2019-08-31	5.294490
2019-09-30	5.754603
2019-10-31	6.254701
2019-11-30	6.798260
2019-12-31	7.389056
2020-01-31	8.031195
2020-02-29	8.729138
2020-03-31	9.487736
2020-04-30	10.312259

```
In [230]: with plt.style.context('bmh'):  
          df.plot()
```



datetime

```
In [231]: datetime.now()
```

```
Out[231]: datetime.datetime(2022, 5, 7, 19, 32, 12, 766057)
```

```
In [232]: t = datetime.now()  
          t.year
```

```
Out[232]: 2022
```

```
In [233]: t.month
```

```
Out[233]: 5
```

```
In [234]: t.day
```

```
Out[234]: 7
```

```
In [235]: t.hour, t.minute, t.second
```

```
Out[235]: (19, 32, 12)
```

```
In [236]: #
```

```
In [237]: dt = datetime(2021, 2, 1)
          dt
```

```
Out[237]: datetime.datetime(2021, 2, 1, 0, 0)
```

```
In [238]: str(dt)
```

```
Out[238]: '2021-02-01 00:00:00'
```

```
In [239]: dt.strftime('%Y-%d-%m')
```

```
Out[239]: '2021-01-02'
```

```
In [240]: #
```

```
In [241]: dt1 = datetime(2021, 1, 1)
          dt2 = datetime(2021, 2, 1)
          dt2 - dt1
```

```
Out[241]: datetime.timedelta(days=31)
```

pd.Timestamp

```
In [242]: # Pandas replacement for python datetime.datetime object.
```

```
In [243]: datetime(2021, 1, 20)
```

```
Out[243]: datetime.datetime(2021, 1, 20, 0, 0)
```

```
In [244]: pd.Timestamp("2021-1-20")
```

```
Out[244]: Timestamp('2021-01-20 00:00:00')
```

```
In [245]: pd.Timestamp(year=2021, month=1, day=20)
```

```
Out[245]: Timestamp('2021-01-20 00:00:00')
```

```
In [246]: pd.Timestamp(2021, 1, 20, 14)
```

```
Out[246]: Timestamp('2021-01-20 14:00:00')
```

```
In [247]: pd.Timestamp(1621000000, unit='s')
```

```
Out[247]: Timestamp('2021-05-14 13:46:40')
```

```
In [248]: ▶ f = pd.Timestamp("2021-1-23")  
          f.day_name()
```

```
Out[248]: 'Saturday'
```

```
In [249]: ▶ s = f + pd.Timedelta("1 day")  
          s.day_name()
```

```
Out[249]: 'Sunday'
```

```
In [250]: ▶ f = pd.Timestamp("2021-1-23")  
          m = f + pd.offsets.BDay() # <BusinessDay>  
          m.day_name()
```

```
Out[250]: 'Monday'
```

date_range

```
In [251]: ▶ pd.date_range('2021-1-20', periods=3)
```

```
Out[251]: DatetimeIndex(['2021-01-20', '2021-01-21', '2021-01-22'], dtype='datetime64  
[ns]', freq='D')
```

```
In [252]: ▶ pd.date_range('2021-01-20', periods=3, freq='D')
```

```
Out[252]: DatetimeIndex(['2021-01-20', '2021-01-21', '2021-01-22'], dtype='datetime64  
[ns]', freq='D')
```

```
In [253]: ▶ pd.date_range('2021-01-20', periods=3, freq='7D')
```

```
Out[253]: DatetimeIndex(['2021-01-20', '2021-01-27', '2021-02-03'], dtype='datetime64  
[ns]', freq='7D')
```

```
In [254]: ▶ pd.date_range('2021-01-20', periods=3, freq='M')
```

```
Out[254]: DatetimeIndex(['2021-01-31', '2021-02-28', '2021-03-31'], dtype='datetime64  
[ns]', freq='M')
```

```
In [255]: ▶ pd.date_range('2021-01-20', periods=27, freq='H')
```

```
Out[255]: DatetimeIndex(['2021-01-20 00:00:00', '2021-01-20 01:00:00',  
                        '2021-01-20 02:00:00', '2021-01-20 03:00:00',  
                        '2021-01-20 04:00:00', '2021-01-20 05:00:00',  
                        '2021-01-20 06:00:00', '2021-01-20 07:00:00',  
                        '2021-01-20 08:00:00', '2021-01-20 09:00:00',  
                        '2021-01-20 10:00:00', '2021-01-20 11:00:00',  
                        '2021-01-20 12:00:00', '2021-01-20 13:00:00',  
                        '2021-01-20 14:00:00', '2021-01-20 15:00:00',  
                        '2021-01-20 16:00:00', '2021-01-20 17:00:00',  
                        '2021-01-20 18:00:00', '2021-01-20 19:00:00',  
                        '2021-01-20 20:00:00', '2021-01-20 21:00:00',  
                        '2021-01-20 22:00:00', '2021-01-20 23:00:00',  
                        '2021-01-21 00:00:00', '2021-01-21 01:00:00',  
                        '2021-01-21 02:00:00'],  
                        dtype='datetime64[ns]', freq='H')
```

```
In [256]: ▶ # weekly frequency
```

```
In [257]: ▶ pd.date_range('2021-01-20', periods=3, freq='W')
```

```
Out[257]: DatetimeIndex(['2021-01-24', '2021-01-31', '2021-02-07'], dtype='datetime64  
[ns]', freq='W-SUN')
```

```
In [258]: ▶ pd.date_range('2021-01-20', periods=3, freq='W-SUN')
```

```
Out[258]: DatetimeIndex(['2021-01-24', '2021-01-31', '2021-02-07'], dtype='datetime64  
[ns]', freq='W-SUN')
```

```
In [259]: ▶ pd.date_range('2021-01-20', periods=3, freq='W-SAT')
```

```
Out[259]: DatetimeIndex(['2021-01-23', '2021-01-30', '2021-02-06'], dtype='datetime64  
[ns]', freq='W-SAT')
```

```
In [260]: ▶ pd.date_range('2021-01-20', periods=3, freq='W-WED')
```

```
Out[260]: DatetimeIndex(['2021-01-20', '2021-01-27', '2021-02-03'], dtype='datetime64  
[ns]', freq='W-WED')
```

```
In [261]: ▶ #
```

```
In [262]: ▶ pd.date_range(end='2021-01-20', periods=3)
```

```
Out[262]: DatetimeIndex(['2021-01-18', '2021-01-19', '2021-01-20'], dtype='datetime64  
[ns]', freq='D')
```

```
In [263]: ▶ pd.date_range('2021-01-01', '2021-01-03')
```

```
Out[263]: DatetimeIndex(['2021-01-01', '2021-01-02', '2021-01-03'], dtype='datetime64[ns]', freq='D')
```

```
In [264]: ▶ pd.date_range(start='2021-01-01', end='2021-01-03')
```

```
Out[264]: DatetimeIndex(['2021-01-01', '2021-01-02', '2021-01-03'], dtype='datetime64[ns]', freq='D')
```

```
In [265]: ▶ pd.date_range('2021-01-01', '2021-04-01', freq='M')
```

```
Out[265]: DatetimeIndex(['2021-01-31', '2021-02-28', '2021-03-31'], dtype='datetime64[ns]', freq='M')
```

```
In [266]: ▶ pd.date_range('2021-01-25', '2021-02-03', freq='12h')
```

```
Out[266]: DatetimeIndex(['2021-01-25 00:00:00', '2021-01-25 12:00:00',  
                        '2021-01-26 00:00:00', '2021-01-26 12:00:00',  
                        '2021-01-27 00:00:00', '2021-01-27 12:00:00',  
                        '2021-01-28 00:00:00', '2021-01-28 12:00:00',  
                        '2021-01-29 00:00:00', '2021-01-29 12:00:00',  
                        '2021-01-30 00:00:00', '2021-01-30 12:00:00',  
                        '2021-01-31 00:00:00', '2021-01-31 12:00:00',  
                        '2021-02-01 00:00:00', '2021-02-01 12:00:00',  
                        '2021-02-02 00:00:00', '2021-02-02 12:00:00',  
                        '2021-02-03 00:00:00'],  
                        dtype='datetime64[ns]', freq='12H')
```

```
In [267]: ▶ pd.date_range('2021-01-20', '2021-02-07', freq='W')
```

```
Out[267]: DatetimeIndex(['2021-01-24', '2021-01-31', '2021-02-07'], dtype='datetime64[ns]', freq='W-SUN')
```

```
In [268]: ▶ # period_range
```

```
In [269]: ▶ pd.period_range('2021-01-25', '2021-02-03')
```

```
Out[269]: PeriodIndex(['2021-01-25', '2021-01-26', '2021-01-27', '2021-01-28',  
                      '2021-01-29', '2021-01-30', '2021-01-31', '2021-02-01',  
                      '2021-02-02', '2021-02-03'],  
                      dtype='period[D]', freq='D')
```

```
In [270]: ▶ pd.date_range('2021-1-25', '2021-2-3')
```

```
Out[270]: DatetimeIndex(['2021-01-25', '2021-01-26', '2021-01-27', '2021-01-28',  
                        '2021-01-29', '2021-01-30', '2021-01-31', '2021-02-01',  
                        '2021-02-02', '2021-02-03'],  
                        dtype='datetime64[ns]', freq='D')
```

```
In [271]: #
```

```
In [272]: pd.date_range('2021-01-20', '2021-02-20', freq='B') # B : business day f
```

```
Out[272]: DatetimeIndex(['2021-01-20', '2021-01-21', '2021-01-22', '2021-01-25',  
                        '2021-01-26', '2021-01-27', '2021-01-28', '2021-01-29',  
                        '2021-02-01', '2021-02-02', '2021-02-03', '2021-02-04',  
                        '2021-02-05', '2021-02-08', '2021-02-09', '2021-02-10',  
                        '2021-02-11', '2021-02-12', '2021-02-15', '2021-02-16',  
                        '2021-02-17', '2021-02-18', '2021-02-19'],  
                        dtype='datetime64[ns]', freq='B')
```

```
In [273]: pd.bdate_range('2021-01-20', '2021-02-20') # business day
```

```
Out[273]: DatetimeIndex(['2021-01-20', '2021-01-21', '2021-01-22', '2021-01-25',  
                        '2021-01-26', '2021-01-27', '2021-01-28', '2021-01-29',  
                        '2021-02-01', '2021-02-02', '2021-02-03', '2021-02-04',  
                        '2021-02-05', '2021-02-08', '2021-02-09', '2021-02-10',  
                        '2021-02-11', '2021-02-12', '2021-02-15', '2021-02-16',  
                        '2021-02-17', '2021-02-18', '2021-02-19'],  
                        dtype='datetime64[ns]', freq='B')
```

```
In [274]: pd.date_range('2021-01-20', '2021-02-20', freq='BM') # BM : business mont
```

```
Out[274]: DatetimeIndex(['2021-01-29'], dtype='datetime64[ns]', freq='BM')
```

pd.to_datetime

```
In [275]: pd.to_datetime("January 20, 2021")
```

```
Out[275]: Timestamp('2021-01-20 00:00:00')
```

```
In [276]: pd.to_datetime("2021/1/20")
```

```
Out[276]: Timestamp('2021-01-20 00:00:00')
```

```
In [277]: pd.to_datetime("2021.1.20")
```

```
Out[277]: Timestamp('2021-01-20 00:00:00')
```

```
In [278]: pd.to_datetime("2021/20/1", format="%Y/%d/%m")
```

```
Out[278]: Timestamp('2021-01-20 00:00:00')
```



```
In [279]: ▶ pd.to_datetime("20-1-2021 12:36", format="%d-%m-%Y %H:%M")
```

```
Out[279]: Timestamp('2021-01-20 12:36:00')
```

```
In [280]: ▶ #
```

```
In [281]: ▶ pd.to_datetime(["5-1-2021"])
```

```
Out[281]: DatetimeIndex(['2021-05-01'], dtype='datetime64[ns]', freq=None)
```

```
In [282]: ▶ pd.to_datetime(["5-1-2021"], dayfirst=True)
```

```
Out[282]: DatetimeIndex(['2021-01-05'], dtype='datetime64[ns]', freq=None)
```

```
In [283]: ▶ f = pd.DataFrame({"year": [2020, 2021], "month": [2, 7], "day": [14, 25]})
f
```

```
Out[283]:
```

	year	month	day
0	2020	2	14
1	2021	7	25

```
In [284]: ▶ pd.to_datetime(f)
```

```
Out[284]: 0    2020-02-14
1    2021-07-25
dtype: datetime64[ns]
```

Hour , Minute

```
In [285]: ▶ from pandas.tseries.offsets import Hour
from pandas.tseries.offsets import Minute
```

```
In [286]: ▶ Hour(1) + Minute(15)
```

```
Out[286]: <75 * Minutes>
```

```
In [287]: ▶ Hour(2) + Minute(45)
```

```
Out[287]: <165 * Minutes>
```

```
In [288]: ▶ pd.Timestamp('2021-01-20 04:00:00') + Hour(2)
```

```
Out[288]: Timestamp('2021-01-20 06:00:00')
```

```
In [289]: ▶ pd.Timestamp('2021-01-20 04:00:00') + Minute(3)
```

```
Out[289]: Timestamp('2021-01-20 04:03:00')
```

Day, MonthEnd

```
In [290]: ▶ from pandas.tseries.offsets import Day  
from pandas.tseries.offsets import MonthEnd
```

```
In [291]: ▶ t = datetime(2021, 1, 20)  
t
```

```
Out[291]: datetime.datetime(2021, 1, 20, 0, 0)
```

```
In [292]: ▶ t + Day(5)
```

```
Out[292]: Timestamp('2021-01-25 00:00:00')
```

```
In [293]: ▶ t + MonthEnd(3)
```

```
Out[293]: Timestamp('2021-03-31 00:00:00')
```

rollback , rollforward

```
In [294]: ▶ t = datetime(2021, 1, 20)  
t
```

```
Out[294]: datetime.datetime(2021, 1, 20, 0, 0)
```

```
In [295]: ▶ MonthEnd().rollforward(t)
```

```
Out[295]: Timestamp('2021-01-31 00:00:00')
```

```
In [296]: ▶ MonthEnd().rollback(t)
```

```
Out[296]: Timestamp('2020-12-31 00:00:00')
```

asfreq

```
In [297]: ▶ pd.Period('2021').asfreq('D', 'start')
```

```
Out[297]: Period('2021-01-01', 'D')
```

```
In [298]: ▶ pd.Period('2021').asfreq('D', 'end')
```

```
Out[298]: Period('2021-12-31', 'D')
```

```
In [299]: ▶ pd.Period('2021').asfreq('M', 'start')
```

```
Out[299]: Period('2021-01', 'M')
```

```
In [300]: ▶ pd.Period('2021').asfreq('M', 'end')
```

```
Out[300]: Period('2021-12', 'M')
```

Time Series

```
In [301]: ▶ i = pd.period_range('2021-1-20', '2021-1-22', freq='D')
```

```
myser = pd.Series(np.random.randn(3), index=i)
myser
```

```
Out[301]: 2021-01-20   -1.206070
          2021-01-21    0.205706
          2021-01-22   -1.632516
          Freq: D, dtype: float64
```

```
In [302]: ▶ myser['2021-01-20']
```

```
Out[302]: -1.2060704621973182
```

```
In [303]: ▶ s = pd.Series(i)
s
```

```
Out[303]: 0    2021-01-20
          1    2021-01-21
          2    2021-01-22
          dtype: period[D]
```

```
In [304]: ▶ s[0]
```

```
Out[304]: Period('2021-01-20', 'D')
```

```
In [305]: ▶ #
```

```
In [306]: ▶ r = pd.period_range("2021-1-20", freq="M", periods=3)
pd.Series(r)
```

```
Out[306]: 0    2021-01
          1    2021-02
          2    2021-03
dtype: period[M]
```

```
In [307]: ▶ i = pd.date_range('2021-1-20', periods=5, freq='5d')
ts = pd.Series(np.random.randn(5), index=i)
ts
```

```
Out[307]: 2021-01-20    0.868751
          2021-01-25    0.721133
          2021-01-30   -0.421394
          2021-02-04   -0.405416
          2021-02-09    1.153106
Freq: 5D, dtype: float64
```

```
In [308]: ▶ i = pd.date_range('2021-1-20', '2021-6-30', freq="BM")
ts = pd.Series(np.random.randn(len(i)), index=i)
ts
```

```
Out[308]: 2021-01-29   -1.154628
          2021-02-26    1.314896
          2021-03-31   -0.078283
          2021-04-30   -1.861597
          2021-05-31   -0.017955
          2021-06-30    0.086011
Freq: BM, dtype: float64
```

```
In [309]: ▶ i = pd.date_range("2021-1-20", periods=10, freq="H")
ts = pd.Series(range(10), index=i)
ts
```

```
Out[309]: 2021-01-20 00:00:00    0
          2021-01-20 01:00:00    1
          2021-01-20 02:00:00    2
          2021-01-20 03:00:00    3
          2021-01-20 04:00:00    4
          2021-01-20 05:00:00    5
          2021-01-20 06:00:00    6
          2021-01-20 07:00:00    7
          2021-01-20 08:00:00    8
          2021-01-20 09:00:00    9
Freq: H, dtype: int64
```

```
In [310]: ▶ ts[:2]
```

```
Out[310]: 2021-01-20 00:00:00    0
          2021-01-20 01:00:00    1
Freq: H, dtype: int64
```

```
In [311]: ts[::2]
```

```
Out[311]: 2021-01-20 00:00:00    0
          2021-01-20 02:00:00    2
          2021-01-20 04:00:00    4
          2021-01-20 06:00:00    6
          2021-01-20 08:00:00    8
          Freq: 2H, dtype: int64
```

```
In [312]: ts["2021-01-20 04:00:00"]
```

```
Out[312]: 4
```

truncate

```
In [313]: i = [datetime(2020, 1, 16), datetime(2021, 1, 19), datetime(2021, 1, 20), da
          ts = pd.Series(range(4), index=i)
          ts
```

```
Out[313]: 2020-01-16    0
          2021-01-19    1
          2021-01-20    2
          2021-01-22    3
          dtype: int64
```

```
In [314]: ts.index[3]
```

```
Out[314]: Timestamp('2021-01-22 00:00:00')
```

```
In [315]: ts[ts.index[3]]
```

```
Out[315]: 3
```

```
In [316]: ts[:2]
```

```
Out[316]: 2020-01-16    0
          2021-01-19    1
          dtype: int64
```

```
In [317]: ts2 = ts.truncate(after='2021-1-19')
          ts2
```

```
Out[317]: 2020-01-16    0
          2021-01-19    1
          dtype: int64
```

```
In [318]: ts3 = ts.truncate(before='2021-1-19')
          ts3
```

```
Out[318]: 2021-01-19    1
          2021-01-20    2
          2021-01-22    3
          dtype: int64
```

```
In [319]: # Loc
```

```
In [320]: i = pd.date_range('2021-1-20', periods=4, freq='W-WED')
          df = pd.DataFrame(np.random.randn(4, 2), index=i, columns=['A', 'B'])
          df
```

```
Out[320]:
```

	A	B
2021-01-20	-0.670114	1.375800
2021-01-27	-1.786033	0.019784
2021-02-03	2.378681	-1.242852
2021-02-10	-0.446476	-1.420543

```
In [321]: df.loc['2021-2']
```

```
Out[321]:
```

	A	B
2021-02-03	2.378681	-1.242852
2021-02-10	-0.446476	-1.420543

```
In [322]: df.loc['2021-2-3']
```

```
Out[322]: A    2.378681
          B   -1.242852
          Name: 2021-02-03 00:00:00, dtype: float64
```

DatetimeIndex

```
In [323]: i = pd.DatetimeIndex(['2000-01-01', '2000-01-02', '2000-01-02', '2021-01-03'])
          #i = [datetime(2000, 1, 1), datetime(2000, 1, 2), datetime(2000, 1, 2), date
```

```
In [324]: ts = pd.Series([6, 3, 7, 5], index=i)
          ts
```

```
Out[324]: 2000-01-01    6
          2000-01-02    3
          2000-01-02    7
          2021-01-03    5
          dtype: int64
```

```
In [325]: ts['2000-01-02']
```

```
Out[325]: 2000-01-02    3
          2000-01-02    7
          dtype: int64
```

```
In [326]: ts.index.is_unique
```

```
Out[326]: False
```

```
In [327]: ts.groupby(level=0).max()
```

```
Out[327]: 2000-01-01    6
          2000-01-02    7
          2021-01-03    5
          dtype: int64
```

shift

```
In [328]: i = pd.date_range('2021-01-20', periods=4, freq='D')
          ts = pd.Series([1, 2, 3, 4], index=i)
          ts
```

```
Out[328]: 2021-01-20    1
          2021-01-21    2
          2021-01-22    3
          2021-01-23    4
          Freq: D, dtype: int64
```

```
In [329]: ts.shift(1)
```

```
Out[329]: 2021-01-20    NaN
          2021-01-21    1.0
          2021-01-22    2.0
          2021-01-23    3.0
          Freq: D, dtype: float64
```

```
In [330]: ts.shift(-1)
```

```
Out[330]: 2021-01-20    2.0  
          2021-01-21    3.0  
          2021-01-22    4.0  
          2021-01-23    NaN  
          Freq: D, dtype: float64
```

```
In [331]: ts
```

```
Out[331]: 2021-01-20    1  
          2021-01-21    2  
          2021-01-22    3  
          2021-01-23    4  
          Freq: D, dtype: int64
```

```
In [332]: ts.shift(2, freq='D')
```

```
Out[332]: 2021-01-22    1  
          2021-01-23    2  
          2021-01-24    3  
          2021-01-25    4  
          Freq: D, dtype: int64
```

resampe

```
In [333]: i = pd.date_range('2021-1-20', periods=2, freq='W-WED')  
  
df = pd.DataFrame([[1, 2],[4, 5]], index=i, columns=['Hamedan', 'Tehran'])  
df
```

```
Out[333]:
```

	Hamedan	Tehran
2021-01-20	1	2
2021-01-27	4	5


```
In [334]: df.resample('D').asfreq()
```

Out[334]:

	Hamedan	Tehran
2021-01-20	1.0	2.0
2021-01-21	NaN	NaN
2021-01-22	NaN	NaN
2021-01-23	NaN	NaN
2021-01-24	NaN	NaN
2021-01-25	NaN	NaN
2021-01-26	NaN	NaN
2021-01-27	4.0	5.0

```
In [335]: df.resample('D').ffill(limit=2)
```

Out[335]:

	Hamedan	Tehran
2021-01-20	1.0	2.0
2021-01-21	1.0	2.0
2021-01-22	1.0	2.0
2021-01-23	NaN	NaN
2021-01-24	NaN	NaN
2021-01-25	NaN	NaN
2021-01-26	NaN	NaN
2021-01-27	4.0	5.0

```
In [336]: #
```

```
In [337]: i = pd.date_range('2021-1-20 00:00', periods=4, freq='1min')
df = pd.DataFrame({'time': i, 'value': np.arange(4)})
df
```

Out[337]:

	time	value
0	2021-01-20 00:00:00	0
1	2021-01-20 00:01:00	1
2	2021-01-20 00:02:00	2
3	2021-01-20 00:03:00	3

```
In [338]: f = df.set_index('time')  
f
```

Out[338]:

	value
time	
2021-01-20 00:00:00	0
2021-01-20 00:01:00	1
2021-01-20 00:02:00	2
2021-01-20 00:03:00	3

```
In [339]: f.resample('3min').count()
```

Out[339]:

	value
time	
2021-01-20 00:00:00	3
2021-01-20 00:03:00	1

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[Codes and Projects \(click here\) \(https://github.com/Amin-Golzari-Oskouei/Python-Programming-Course-Advanced-2021\)](https://github.com/Amin-Golzari-Oskouei/Python-Programming-Course-Advanced-2021) [slides and videos \(click here\) \(https://drive.google.com/drive/folders/1Dx3v7fD1QBWL-MNP2hd7ilxaRbeALkKA\)](https://drive.google.com/drive/folders/1Dx3v7fD1QBWL-MNP2hd7ilxaRbeALkKA)